

## General construction appraisal certificate

Appraisal certificate number:

P-3637/913/11-MPA BS

Subject:

Cable systems with integrated functional integrity, functional integrity class "E30", "E60" or "E90" according to DIN 4102-12: 1998-11  
Pursuant to consecutive number 2.9 construction rules list A Part 3 – issue 2015/2 Construction types for the production of electrical cable systems which are subject to requirements regarding functional integrity under fire exposure.

Applicant:

Hemmink B.V.  
Postbus 40013  
8004 DA Zwolle  
Nederland



Issuing date:

29 June 2017

Validity period:

29 June 2017 to 28 June 2022

This general construction appraisal certificate comprises 13 pages and 8 annexes.

This general construction appraisal certificate replaces the general construction appraisal certificate number P-3637/913/11-MPA BS issued on 10 April 2012.

This general construction appraisal certificate number P-3637/913/11-MPA BS was initially issued on 10 April 2012.

This general construction appraisal certificate shall only be disseminated in full and unaltered. Extracts or censoring require the written permission of MPA Braunschweig. Documents without signature and seal are invalid. Every page of this general construction appraisal certificate is marked with the official seal of MPA Braunschweig.

## A A General provisions

The general construction appraisal certificate proves the applicability of the construction type in accordance with the state construction regulations.

The general construction appraisal certificate is not to be understood as a substitute for the statutory permits, approvals and certificates required for the execution of construction projects.

The general construction appraisal certificate is issued without prejudice to third-party rights, in particular private property rights.

Without prejudice to further regulations as laid down under "Special provisions", manufacturers or distributors of the construction type shall be liable to provide the user of the construction type with copies of the general construction appraisal certificate. At construction sites, users shall carry the general construction appraisal certificate with them.

The general construction appraisal certificate shall only be reproduced in full. The publishing of extracts requires the written permission of MPA Braunschweig. Texts and drawings of advertising materials shall not be inconsistent with the general construction appraisal certificate. Translations of the general construction appraisal certificate shall contain the following note: "This translation of the German original is not approved by MPA Braunschweig".

The issued general construction appraisal certificate may be revoked, amended or altered, particularly in the event of new technical findings.

## B Special provisions

### 1 Subject and scope of application

#### 1.1 Subject

##### 1.1.1

1.1.1 The general construction appraisal certificate (allgemeines bauaufsichtliches Prüfzeugnis – abP) applies to the production and application of cable systems with integrated functional integrity as a construction type which, depending on the design, is allocated to the functional integrity classes "E30", "E60" or "E90" according to DIN 4102-12:1998-11\*).

The classification applies to cable systems that involve cable types which, according to section 2.1.1, are to be laid horizontally as wall or ceiling installations (installation types 1 to 4).

The classification also applies to cable systems (installation types 1 to 4) that require the above cable types to run diagonally or vertically if the cable types are supported by a cable support structure within the transition area (horizontally / diagonally or vertically) according to section 2.1.2.

The Materialprüfanstalt für den Bauwesen, Braunschweig is a translation of the original German version. In the event of lack of clarity or doubt about the content of this report, the original German report is always decisive.



\* Due to dated and undated references, this general construction appraisal certificate includes specifications from other publications. The references are quoted at the corresponding text passages and the publications are listed on page 13. With respect to dated references, subsequent alterations or revisions of the corresponding publications shall be observed when using this general construction appraisal certificate. Undated references always refer to the latest edition of the referenced publication.

### 1.1.2

The cable systems with integrated functional integrity shall consist of cable types as laid down in section 2.1.1 as well as of a cable support structure according to section 2.1.2 (special support construction).

## 1.2 Scope of application

### 1.2.3

The cable systems with integrated functional integrity may be allocated to the functional integrity classes "E30", "E60" or "E90" according to DIN 4102-12 if the cable types specified in section 2.1.1 are used in combination with the corresponding cable support structure according to section 2.1.2.

### 1.2.4

The cable systems with integrated functional integrity may be installed on

- ceilings (minimum thickness: 125 mm) consisting of concrete / reinforced concrete or aerated concrete as well as on
- walls (minimum thickness: 100 mm) consisting of masonry, concrete / reinforced concrete or aerated concrete

with fire resistance properties at least equal to those of the subject described in section 1.1.

The classification only applies if the fire resistance properties of the components reinforcing and supporting the ceiling or wall are at least equal to those of the subject described in section 1.1.

### 1.2.5

The scope of application of this general construction appraisal certificate is limited to cables with nominal voltages up to 1 kV.

### 1.2.6

The integrated functional integrity does not cover voltage drops or reduced current carrying capacities caused by a temperature-driven increase in resistance due to impaired heat dissipation of the conductors.

### 1.2.7

The valid VDE provisions shall be complied with.

### 1.2.8

This general construction appraisal certificate is only valid if the integrated functional integrity of the cable systems is not threatened by falling components.

### 1.2.9

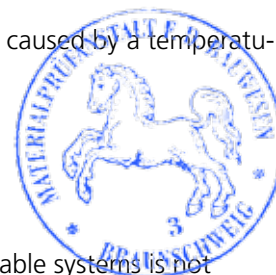
Further requirements or facilitations may arise from the valid technical provisions (e. g. construction regulations, special construction regulations or directives) for the specific construction type.

### 1.2.10

Due to the applicant's statement, the construction type does not involve any products that are subject to the Ordinance of Hazardous Substances, the Chemicals Prohibition Ordinance or the CFC Halon Prohibition Ordinance, or the requirements of the above ordinances (particularly the labelling requirement) are complied with.

Furthermore, if the trade, circulation or application requires measures regarding hygiene, health protection or environmental protection, the applicant agrees to take these measures or make them known in the manners required.

Therefore, there was no reason to examine the environmental and health-related implications of the installed construction products for their compliance with the corresponding requirements.



## 2 Construction type provisions

### 2.1 Structural design of the cable systems with integrated functional integrity

The cable systems consisting of cable support structures (laying procedure 1 to 4) according to section 2.1.2 in conjunction with cable types according to section 2.1.1.

In case of vertical cable laying, effective support according to the constructional limiting conditions of construction 3 must be carried out in accordance with this general construction appraisal certificate.

A combination of the cable systems with integrated functional integrity and the appropriate classification can be found in section 2.1.3.

#### 2.1.1 Cable types

##### 2.1.1.1

1 Cable types Kabelwerk Eupen AG, 4700 Eupen, Belgium.

Only the cable types listed in the tables below shall be used. They shall be certified with a valid VDE approbation specifically issued to Kabelwerk Eupen AG, 4700 Eupen, Belgium.

Section 2.1.3 includes a list of the classified cable types and the corresponding installation method.

Table 1: Cable types of the cable manufacturer Kabelwerk Eupen AG, 4700 Belgium

Cable type / designation according to manufacturer specifications	Dimension Wire count x cross section	VDE-standard	VDE-approbation	
			VDE ID number	VDE register number
[n x mm] or [n x 2 x 0,8 mm...Bd] with $n \geq 2$				
“EUCASAFE” (N)HXH FE180 E90	n x 10 mm <sup>2</sup> n x 16 mm <sup>2</sup>	DIN VDE 0266	40035809 2012-09-13 (last updated 2015-12-11)	8513
“EUCASAFE” JE-H(ST)H Bd FE180 E30	n x 2 x 0,8 Bd	DIN VDE 0815	119117 (last updated 2015-12-11)	7510



## 2.1.1.1

Cable types Dätwyler Cables Solutions AG, 6460 Altdorf, Switzerland

Only the cable types listed in the table below shall be used. They shall be certified with a valid VDE approbation, specifically issued to Dätwyler Cables Solutions AG, 6460 Altdorf, Switzerland.

Section 2.1.3 includes a list of the classified cable types and the corresponding installation method.

Table 2: Cable types of the cable manufacturer Dätwyler Cables Solutions AG, 6460 Altdorf, Switzerland

Cable type / designation according to manufacturer specifications	Dimension Wire count x cross section	VDE-standard	VDE- approbation	
			VDE ID number	VDE register number
	[n x mm] or [n x 2 x 0,8 mm...Bd] with $n \geq 2$			
“Dätwyler Keram” (N)HXH FE180 E30-E60	$\geq n \times 1,5 \text{ mm}^2 \leq n \times 10 \text{ mm}^2$	DIN VDE 0266	40004684 2003-02-14 (last updated 2015-01-28)	7780
“Dätwyler Keram” (N)HXH FE180-E90	$\geq n \times 1,5 \text{ mm}^2 \leq n \times 25 \text{ mm}^2$		40004684 2003-02-14 (last updated 2015-01-28)	7780
“Dätwyler Keram” JE-H((ST)H Bd FE180 E30-E90	$n \times 2 \times 0,8 \text{ Bd.}$	DIN <sup>o</sup> VDE 0815	40028822 20099-11-24 (last updated 2016-05-20)	9361

### 2.1.2 Cable support structure (special support structure)

The components of the cable support structures shall be made of electro-galvanised steel (see annex).

The support structures shall be mounted to the solid ceilings or solid walls by means of suitable steel mounting elements. The structures shall be mounted to the solid ceilings or solid walls by means of the mounting elements described in section 4.2.

The cables are directly mounted to the ceiling or to the wall by means of cable clamps. The cable types shall be mounted by means of cable clamps suitable for the respective cable diameter and in accordance with tables 3 and 4 (see the following sections and the annexes).



## 2.1.2.1

Installation with cable clamps "FBB" (installation methods 1 to 3)

Table 3: Structural boundary conditions for the support structure (installation methods 1 to 3)

Installation method		Installation method 1	Installation method 2	Installation method 3
		Installation via cable clamp		
Cable clamp		Single clamp "FBB" or Two single clamps "FBB"		
Dimensions		Depending on the cable cross section		
Width	b [mm]	20	20	20
Material thickness	t [mm]	1,25	1,25	1,25
Load	q [kg/m]	Single cable	3- cables	Single cable
Span <sup>1)</sup>	a [mm]	300 mm	500 mm	500 mm
Mounting		The cable clamps are mounted on the <b>ceiling or wall</b> by means of screws / dowels / M6 threaded bolts with nuts and washers according to section 2.1.2 in conjunction with section 4.2.		

<sup>1)</sup> Vertical installation requires a maximum mounting distance of 300 mm (see also section 2.1).

For more construction-related details on the installation of the cable system of Hemmink B.V., DA Zwolle, the Netherlands, see the annexes of this general construction appraisal certificate.

## 2.1.2.2

Installation with cable clamps "double clamp" (installation method 4)

Table 4: Structural boundary conditions for the support structure (installation method 4)

Mounting		Installation method 4
Cable clamp		Double clamp
Dimensions		Depending on the cable cross section
Width	b [mm]	20
Material thickness	t [mm]	1,25
Load	q [kg/m]	Single cable
Span <sup>1)</sup>	a [mm]	500 mm
Mounting		The cable clamps are mounted on the <b>ceiling or wall</b> by means of screws / dowels / M6 threaded bolts with nuts and washers according to section 2.1.2 in conjunction with section 4.2.



<sup>1)</sup> Vertical installation requires a maximum mounting distance of 300 mm (see also section 2.1).

For more construction-related details on the installation of the cable system of Hemmink B.V., DA Zwolle, Netherlands, see the annexes of this general construction appraisal certificate.

### 2.1.3 Classification of cable systems with integrated functional integrity

2.1.3.1 Classification of cable systems with cable types by the company Dätwyler Cables Solutions AG, 6460 Altdorf, Switzerland, in combination with special support structures by Hemmink B.V., DA Zwolle, Heltersberg, the Netherlands.

Table 1: Classification of cable systems with cable types "low-voltage cable" (Dätwyler Cables Solutions AG, 6460 Altdorf, Switzerland) in combination with special support structures by Hemmink B.V., DA Zwolle, the Netherlands

Cable type / designation according to manufacturer specifications <sup>2)</sup>	Installation method <sup>2)</sup> <b>Installation on ceiling or wall via cable clamps:</b>  (1) Single clamp "FBB", $a \leq 300$ mm Load = one single cable each (2) Single clamp "FBB", $a \leq 500$ mm Load = three cables (3) Single clamp "FBB", $a \leq 500$ mm or single clamp (double) "FBB", $a \leq 500$ mm Load = one single cable each (4) Double clamp "FBB", $a \leq 500$ mm Load = two single cables	Dimension Wire count x cross section [n x mm <sup>2</sup> ]	Classification according to DIN 4102-12: 1998-11
"Dätwyler Keram" (N)HXH FE180 E30-E60 VDE Reg. Nr. 7780	2	$n \times 1,5^2$ )	E30 tot E60
	3, 4	$n \times \geq 1,5 \leq 10$	E30
"Dätwyler Keram" (N)HXH FE180 E90 VDE Reg. Nr. 7780	1 4)	$n \times \geq 1,5 \leq 25$	E30 tot E90
	3 4)	$n \times \geq 1,5 \leq 25$	E30
	3, 4	$n \times \geq 1,5 \leq 10$	E30

<sup>1)</sup> Installation methods and support structures (Hemmink B.V., DA Zwolle, Netherlands) according to section 2.1.2.

<sup>2)</sup> Cable manufacturer: Dätwyler Cables Solutions AG, 6460 Altdorf, Switzerland, according to section 2.1.1.

<sup>3)</sup> The classification of this cable type "E..." is only valid for this dimension.

<sup>4)</sup> Installation on walls shall only be carried out by means of single clamps "FBB" and clamps open at the top.

Table 2: Classification of cable systems with cable types "110V telecommunication cable" Dätwyler Cables Solutions AG, 6460 Altdorf, Switzerland) in combination with special support structures by Hemmink B.V., DA Zwolle, Netherlands

Cable type / designation according to manufacturer <sup>2)</sup> specifications	Installation method <sup>1)</sup> <b>Installation on ceiling or wall via cable clamps:</b>  (3) Single clamp "FBB", $a \leq 500$ mm or single clamp (double) "FBB", $a \leq 500$ mm Load = one single cable each	Dimension Wire count x diameter [2 x n x mm Bd.] with $n \geq 2$	Classification according to DIN 4102-12: 1998-11
"Dätwyler Keram" JE-H(ST)H Bd FE180 E30-E90 VDE Reg. Nr. 9361	3 <sup>3)</sup>	$n \times 2 \times 0.8$	E30

<sup>1)</sup> Installation methods and support structures (Hemmink B.V., DA Zwolle, the Netherlands) according to section 2.1.2.

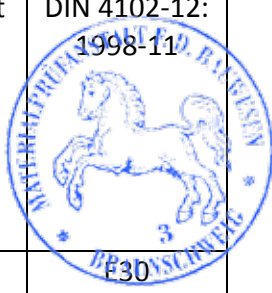
<sup>2)</sup> Cable manufacturer: Dätwyler Cables Solutions AG, 6460 Altdorf, Switzerland, according to section 2.1.1.

<sup>3)</sup> Installation on walls shall only be conducted by means of single clamps "FBB" and clamps open at the top

Vertical installation requires a maximum mounting distance of 300 mm (see also section 2.1).

2.1.3.2 Classification of cable systems with cable types by Kabelwerk Eupen AG, 4700 Eupen, Belgium, in combination with special support structures by Hemmink B.V., DA Zwolle, the Netherlands

Table 3: Classification of cable systems with cable types "low-voltage cable" (Kabelwerk Eupen AG, 4700 Eupen, Belgium) in combination with special support structures by Hemmink B.V., DA Zwolle, the Netherlands

Cable type / designation according to manufacturer <sup>2)</sup> specifications	Installation method <sup>2)</sup> <b>Installation on ceiling or wall via cable clamps:</b>  (3) Single clamp "FBB", a ≤ 500 mm or single clamp (double) "FBB", a ≤ 500 mm Load = one single cable (4) Double clamp "FBB", a ≤ 500 mm Load = two single cables	Dimension  Wire count x cross section [n x mm <sup>2</sup> ]	Classification according to DIN 4102-12: 1998-11 
"UEROSAFE" (N)HXH FE180 E90 VDE Reg. Nr. 8513	3	n x 16 <sup>3)</sup>	E30
	4	n x 10 <sup>3)</sup>	E30

<sup>1)</sup> Installation methods and support structures (Hemmink B.V., DA Zwolle, the Netherlands) according to section 2.1.2.

<sup>2)</sup> Cable manufacturer: Kabelwerk Eupen AG, 4700 Eupen, Belgium, according to section 2.1.1.

<sup>3)</sup> The classification of this cable type "E..." is only valid for this dimension.

Table 4: Classification of cable systems with cable types "110V telecommunication cable" (Kabelwerk Eupen AG, 4700 Eupen, Belgium) in combination with special support structures by Hemmink B.V., DA Zwolle, the Netherlands

Cable type / designation according to manufacturer <sup>2)</sup> specifications	Installation method <sup>2)</sup> <b>Installation on ceiling or wall via cable clamps:</b>  (1) Single clamp "FBB", a ≤ 500 mm, or Single clamp (double) "FBB", a ≤ 500 mm Load = one single cable each	Dimension  Wire count x diameter [2 x n x mm Bd.] with n ≥ 2	Classification according to DIN 4102-12: 1998-11
"EUROSAFE" JE-H(ST)H Bd FE180 E30 VDE Reg. Nr. 7510	3 <sup>3)</sup>	n x 2 x 0.8	E30

<sup>1)</sup> Installation methods and support structures (Hemmink B.V., DA Zwolle, the Netherlands) according to section 2.1.2.

<sup>2)</sup> Cable manufacturer: Kabelwerk Eupen AG, 4700 Eupen, Belgium, according to section 2.1.1.

<sup>3)</sup> Wall installation shall only be conducted by means of single clamps "FBB" and clamps open at the top.

Vertical installation requires a maximum mounting distance of 300 mm (see also section 2.1)



## 2.2 Production and labelling

### 2.2.1 Production

The production and the production site of the respective cable type according to section 2.1.1 is laid down in the corresponding VDE regulations.

### 2.2.2 Labelling of cable types

The cable shall be labelled according to the VDE regulations.

Note: The functional integrity class indicated on the cable type may differ from the functional integrity class of the respective cable system documented in this general construction appraisal certificate.

### 2.2.3 Labelling of the cable system with integrated functional integrity

Every cable system with integrated functional integrity according to this general construction appraisal certificate shall be permanently labelled by the processor with a sign or a sticker. The respective label shall be fixed on the cable support structure and show the following details:

- Name of the contractor who produced the cable system with integrated functional integrity (processor) cable system with integrated functional integrity, allocated to functional integrity class "E 30/60/90" \*), in accordance with DIN 4102-12:1998-11 as well as the general construction appraisal certificate number P-3637/913/11-MPA BS issued by the Braunschweig materials testing institute for the construction industry on 29 June 2017,
- owner of the general construction appraisal certificate and
- manufacturing year.

\*) Delete as applicable.

## 3 Certificate of conformity

The user of the construction type shall confirm that the construction type has been produced in accordance with the general construction appraisal certificate and that the utilised construction products are in accordance with the general construction appraisal certificate (sample of a certificate of conformity, see page 13).

## 4 Provisions for design and dimensioning

### 4.1 Design

Cable systems designs with integrated functional integrity shall be in accordance with the valid VDE regulations. The cable systems shall be suitable for power consumption at increased temperatures. Therefore, possible functional impairments of the cables as a result of thermally driven increases in resistance shall be considered when dimensioning cable systems.



## 4.2 Dimensioning

The support structures shall be mounted to the solid ceiling or wall by means of steel dowels (e.g. steel screws / steel dowels, nail anchors)  $\geq M6$  or  $\geq 6$  mm (stress cross section 20.1 mm<sup>2</sup> each), which are suitable for the base material and application and in accordance with the specifications of valid general appraisal approvals (allgemeine bauaufsichtliche Zulassung – abZ) of the German Institute for Structural Engineering in Berlin or a European Technical Approval (europäisch technische Zulassung - ETA) or a European Technical Assessment (europäisch technische Bewertung – ETA). Those components under tensile stress shall be dimensioned so that their calculated tensile stress is not greater than 9 N/mm<sup>2</sup> (classification “E 30” and “E 60”) or not greater than 6 N/mm<sup>2</sup> (classification “E 90”).

Dowels may be used as an alternative if they have been proven resistant against fire within the framework of a test procedure and assessment regarding the required fire resistance duration. The tests and assessments shall be conducted by an approved testing laboratory.

Dowels shall be installed in accordance with the corresponding technical documents, e. g. assembly directives, approval or assessment (abZ or ETA). In this regard, the suitability of the dowel for the respective base material as well as for the application shall also be approved and proven for the cold mounting condition.

## 5 Provisions for usage and maintenance

The usage and maintenance of the cable systems with integrated functional integrity shall be subject to the provisions of this general construction appraisal certificate. Retrofittings (e.g. cable type, cable count, compliance with the maximum load in kg per running metre) are only possible if the boundary conditions laid down in this general construction appraisal certificate are complied with.

Regardless of the design of the cable system with integrated functional integrity, the contractor (processor) shall always inform the client in writing that the long-term fire protection of the cable system with integrated functional integrity is only ensured if the cable system with integrated functional integrity is kept in good condition at all times and if the proper state of the cable system with integrated functional integrity is restored after changes and modifications.

## 6 Legal basis

This general construction appraisal certificate is issued on the basis of § 19 of the construction regulations of Lower Saxony (Niedersächsische Bauordnung - NBauO) as issued on 3 April 2012 (Nds. GVBI page 46), last updated on the basis of § 4 of the law passed on 6 April 2017 (Nds. GVBI page 116) in conjunction with construction rules list A (Bauregelliste A) of the German Institute for Structural Engineering, edition 2015/2. Corresponding legal bases are also laid down in the state construction regulations of the remaining German federal states.



## 7 Information on legal remedies

An appeal may be filed against this decision at the Braunschweig materials testing institute for the construction industry within one month after it has been announced.



DDipl.-Ing. Rabbe  
Deputy director of the testing institute



Braunschweig, 29.06.2017



On behalf of  
Dipl.-Ing. Maertins  
Official in charge

Directory of applicable standards and directives on the following page.

### Directory of standards and directives

DIN 4102-2: 1977-09:	Fire Behaviour of Building Materials and Building Components; Building Components; Definitions, Requirements and Tests
DIN 4102-4: 1994-03:	Fire behaviour of building materials and building components; composition and application of classified building materials, building components and special building components
DIN 4102-4/A1: 2004-11:	Fire behaviour of building materials and building components; composition and application of classified building materials, components and special components - Amendment A1
DIN 4102-12: 1998-11:	Fire behaviour of building materials and building components - functional integrity of electric cable systems; requirements and testing
DIN VDE 0815: 1988-05:	Wiring cables for telecommunication and data processing systems
DIN VDE 0815/A1: 2006-03:	Wiring cables for telecommunication and data processing systems - Amendment 1
DIN VDE 0266: 2000-03:	Power cables with improved characteristics in the case of fire - Nominal Voltages U /U 0.6/1 kV
DIN VDE 0266: Corrigenda 1 2006-03:	Power cables with improved characteristics in the case of fire - Nominal Voltages U /U 0.6/1 kV, Corrigenda to DIN VDE 0266 (VDE 0266):2000-03
BRL A Part 3:	The valid edition of building rules list A part 3; published in the DIBt notifications.



### Model

#### Sample of a certificate of conformity

- Name and address of the company that produced the cable system with integrated functional integrity according to DIN 4102-12:1998-11
- Construction site or building:
- Date of production:
- Fire resistance class E30 or E60 or E90\*)

This is to confirm that the cable system with integrated functional integrity has been produced and installed professionally in every detail and in accordance with the provisions of the general construction appraisal certificate number P-3637/913/11-MPA BS issued by the Braunschweig materials testing institute for the construction industry on 29 June 2017.

The same is confirmed for the building materials not produced or parts not produced by the signatory themselves, due to

- the actual labelling of the components in accordance with the provisions of the general construction appraisal certificate \*)
- own examinations \*)
- the written confirmations by the manufacturers of the construction products or components, filed by the signatory. \*)

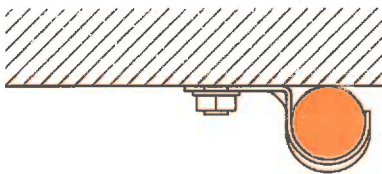
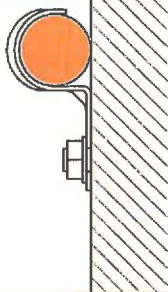
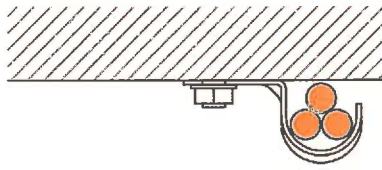
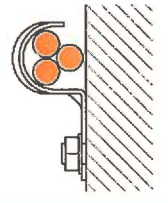
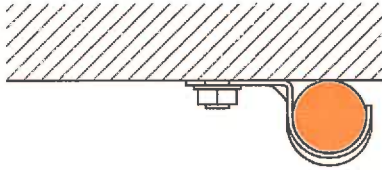
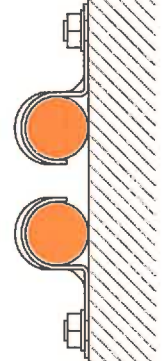
Place, date

Seal and signature

(This certificate shall be given to the building owner, who shall forward it to the responsible building supervisory authority.)

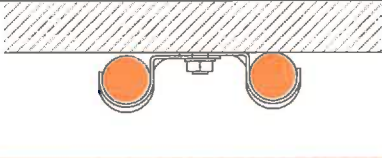
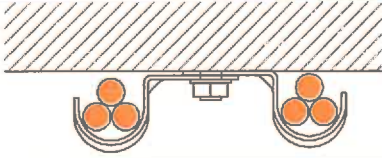

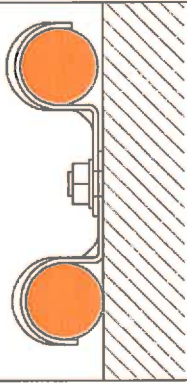

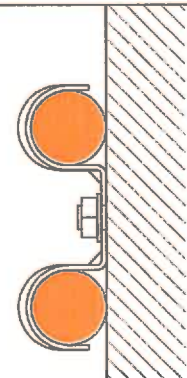


\*) Delete as applicable

Installation method		Ceiling installation	Wall installation
1	1 Single clamp "FBB" $a \leq 300$ mm Load = one single cable each		
2	Single clamp "FBB" $a \leq 500$ mm Load = three cables		
3	Single clamp "FBB" $a \leq 500$ mm or Load = one single cable each		

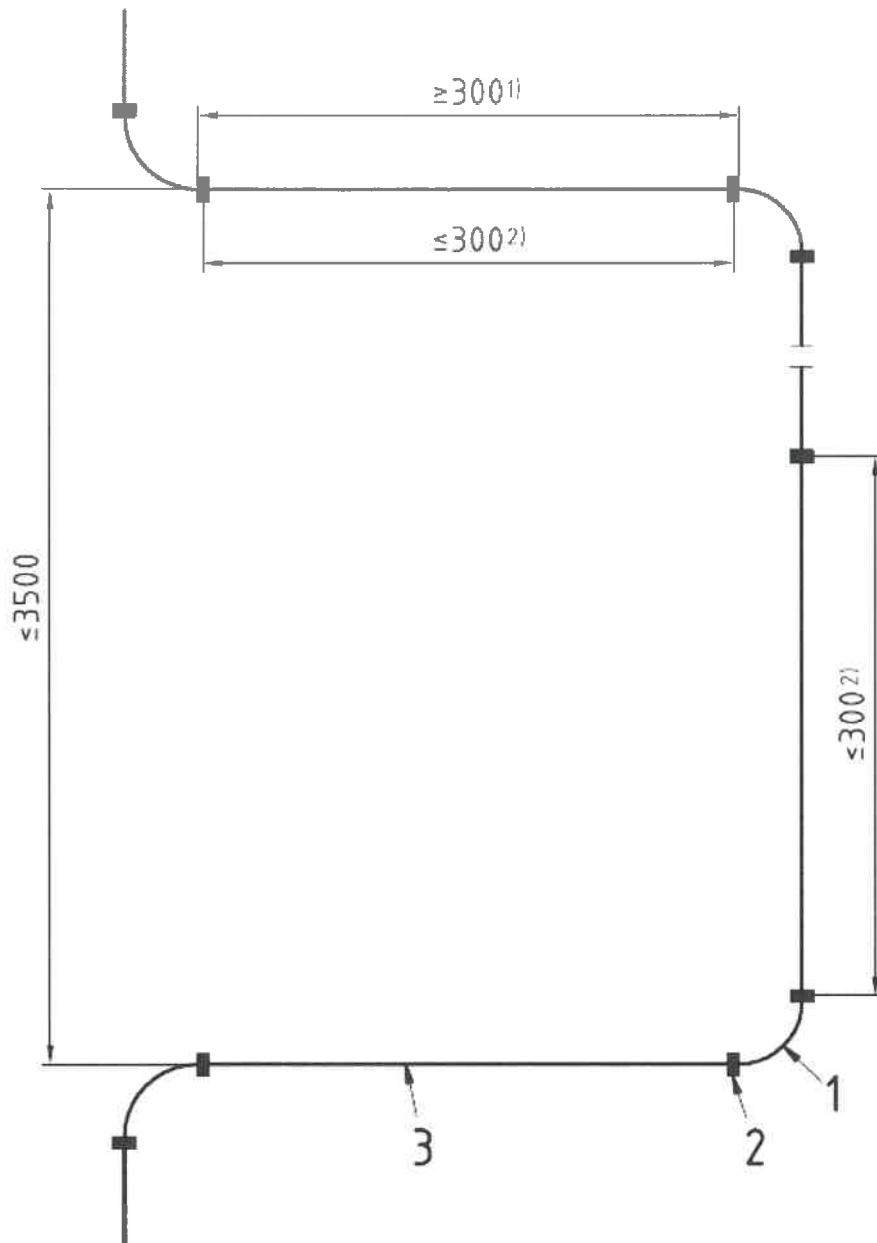


<p>Cable systems with integrated functional integrity</p> <p>"E 30", "E 60" or "E 90" according to DIN 4102-12:1998-11</p> <p>Overview of application with cable clamps "FBB"</p>	<p>Annex 1 to abP number</p> <p>P-3637/913/11-MPA BS issued</p> <p>on 09 June 2017</p>
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Installation method		Ceiling installation	Wall installation
1	1 Single clamp "FBB" $a \leq 300$ mm Load = one single cable each		-
2	Single clamp "FBB" $a \leq 500$ mm Load = three cables		-
3	Single clamp (double) "FBB" $a \leq 500$ mm or Load = one single cable each		
4	Double clamp $a \leq 500$ mm Load = one single cable each		



<p>Cable systems with integrated functional integrity</p> <p>"E 30", "E 60" or "E 90" according to DIN 4102-12:1998-11</p> <p>Overview of application with cable clamps "FBB" (double) and double clamp</p>	<p>Annex 2 to</p> <p>abP number P-3637/913/11-MPA BS issued</p> <p>on 09 June 2017</p>
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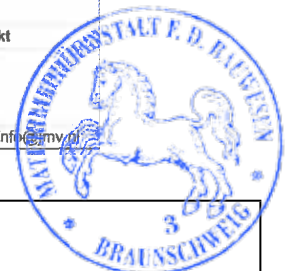
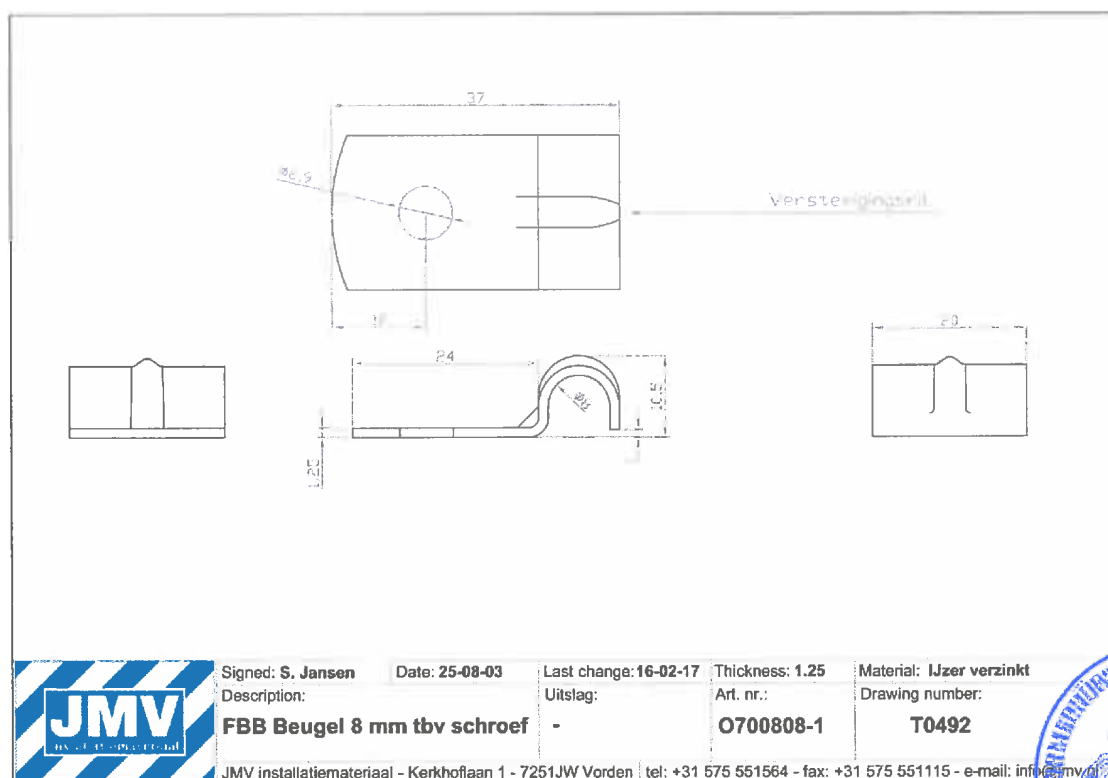
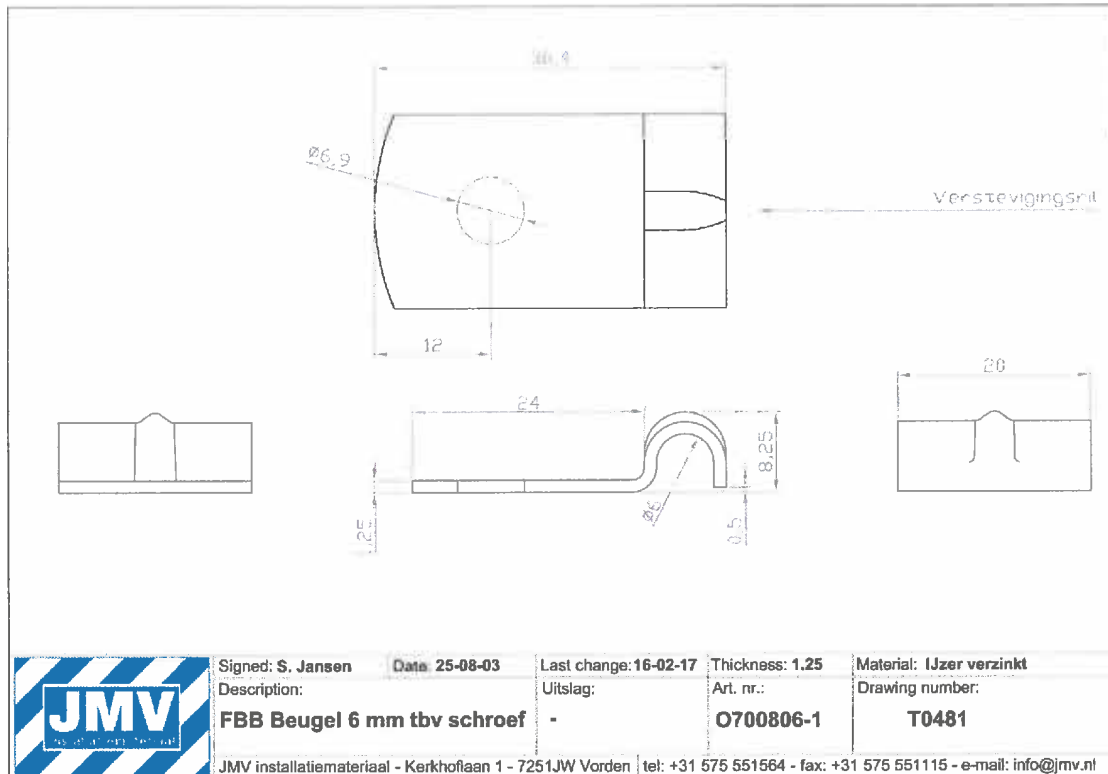


- 1 Admissible bend radius
- 2 Single clamp
- 3 Cable
- <sup>1)</sup> Horizontal cable length  $\geq 300$  mm
- <sup>2)</sup> Clamp distance  $\leq 300$  mm

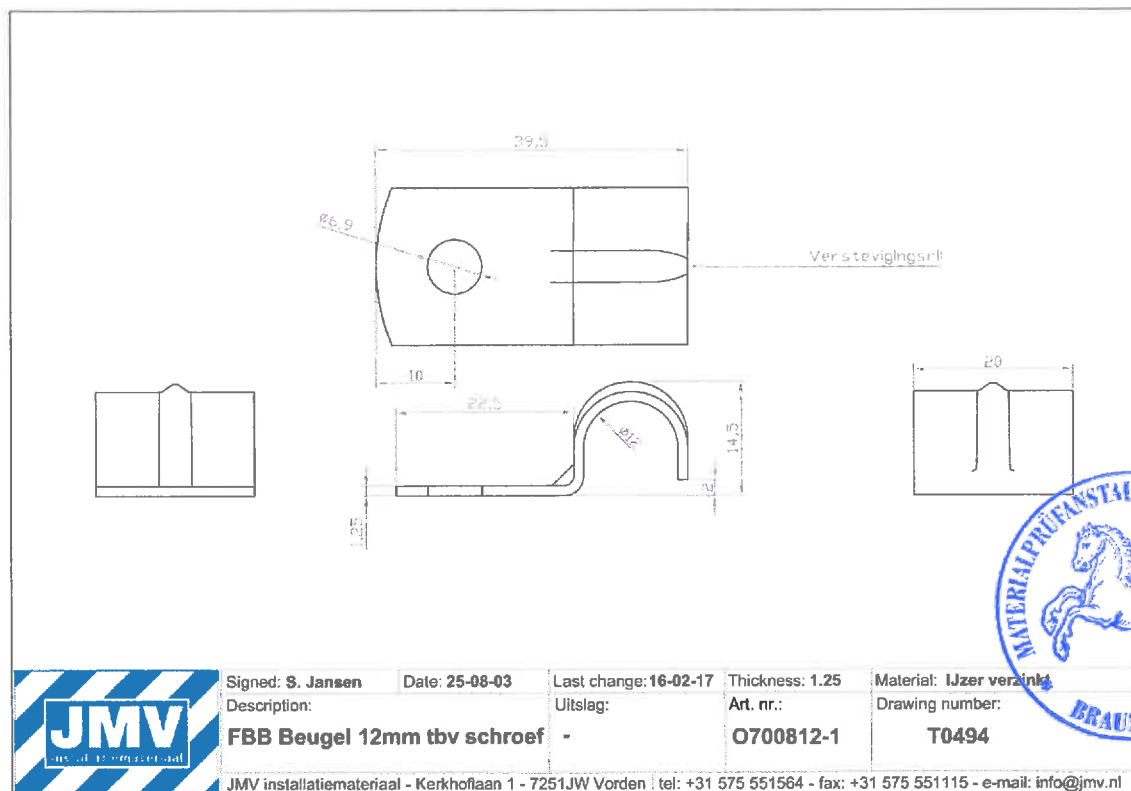
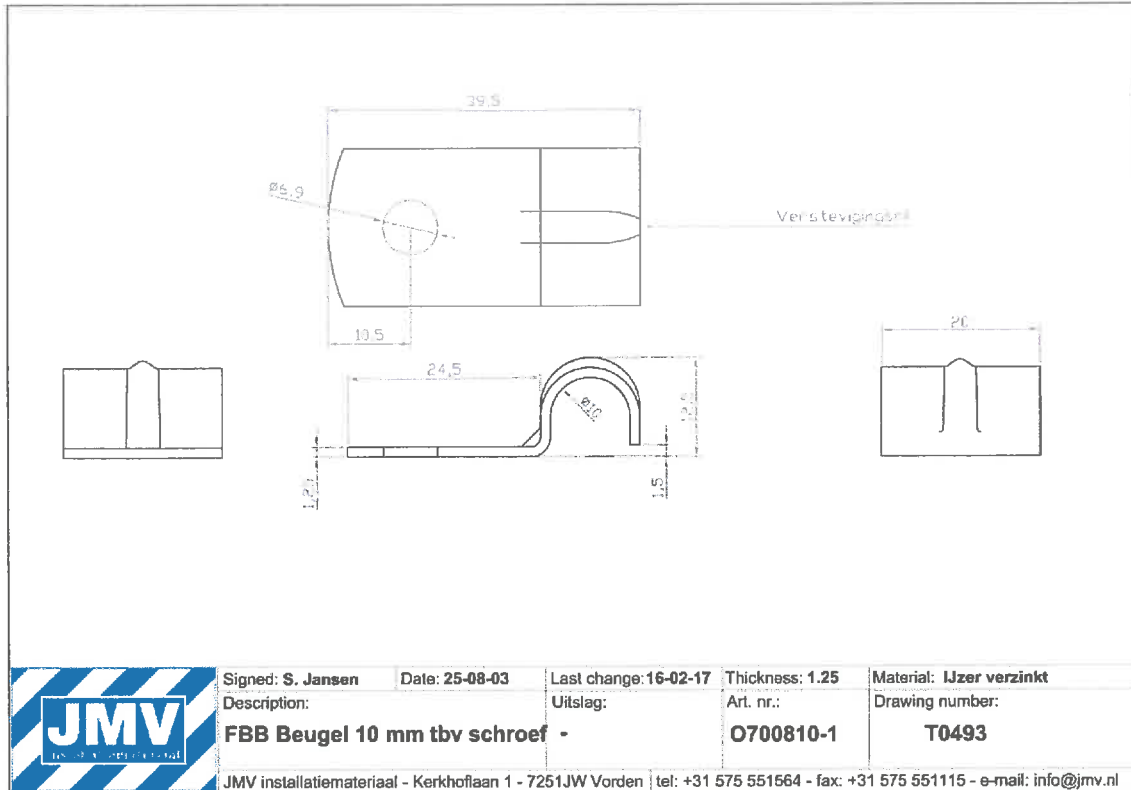


<p>Cable systems with integrated functional integrity</p> <p>"E 30", "E 60" or "E 90" according to DIN 4102-12:1998-11</p> <p>Application of "vertical installation"</p>	<p>Annex 3 to</p> <p>abP number P-3637/913/11-MPA BS</p> <p>issued on 09 June 2017</p>
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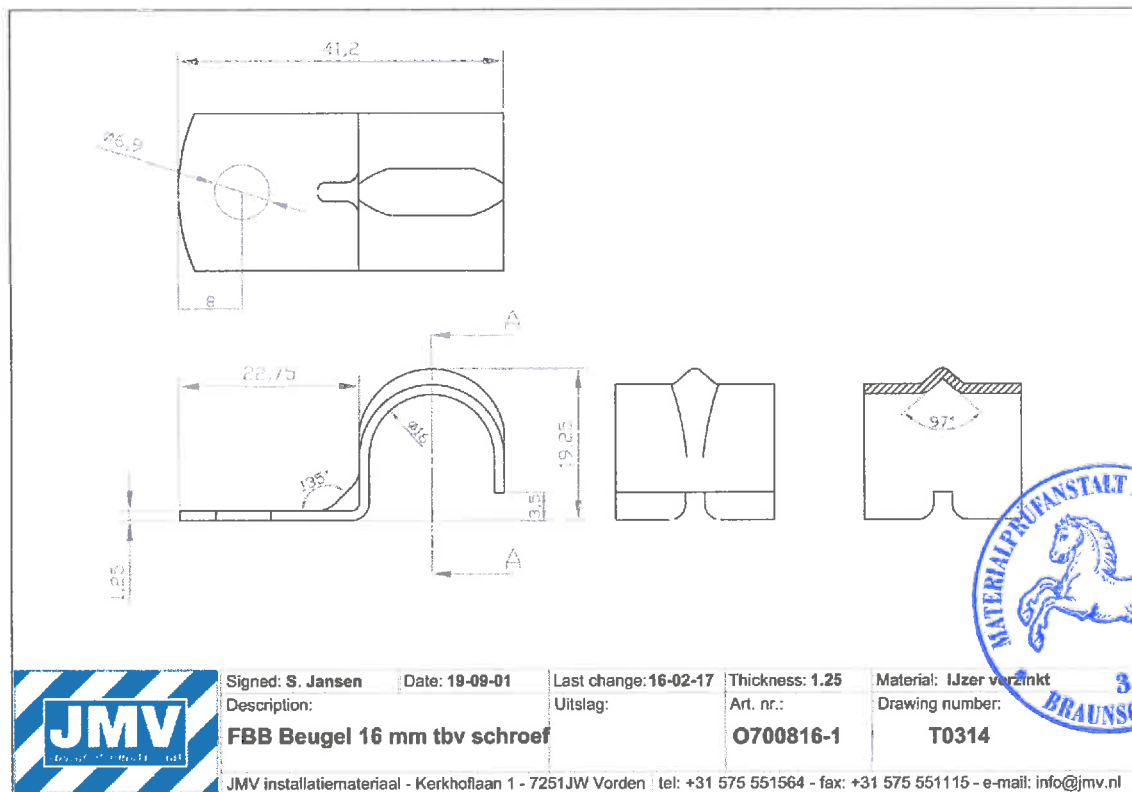
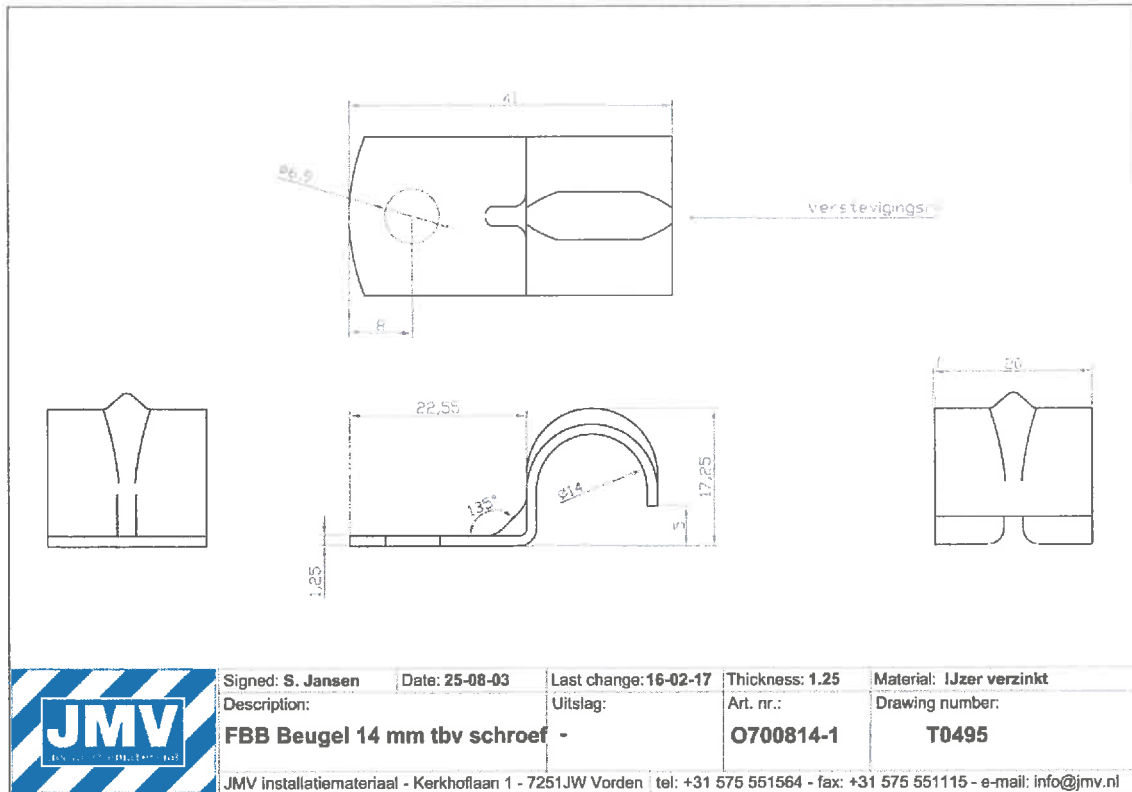




<p>Cable systems with integrated functional integrity</p> <p>“E 30”, “E 60” or “E 90” according to DIN 4102-12:1998-11</p> <p>Cable clamps “FFB”</p>	<p>Annex 4 to</p> <p>abP number P-3637/913/11-MPA BS issued</p> <p>on 09 June 2017</p>
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<p>Cable systems with integrated functional integrity</p> <p>“E 30”, “E 60” or “E 90” according to DIN 4102-12:1998-11</p> <p>Cable clamps “FFB”</p>	<p>Annex 5 to</p> <p>abP number P-3637/913/11-MPA BS issued</p> <p>on 09 June 2017</p>
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Cable systems with integrated functional integrity

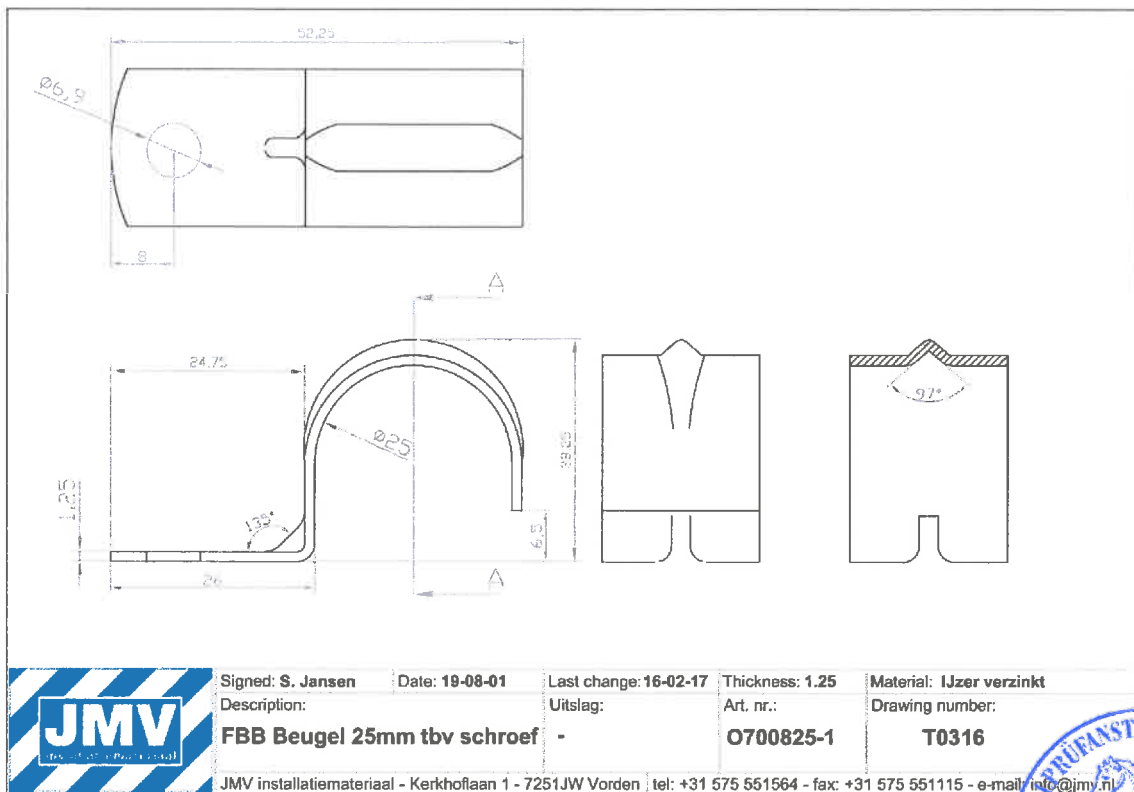
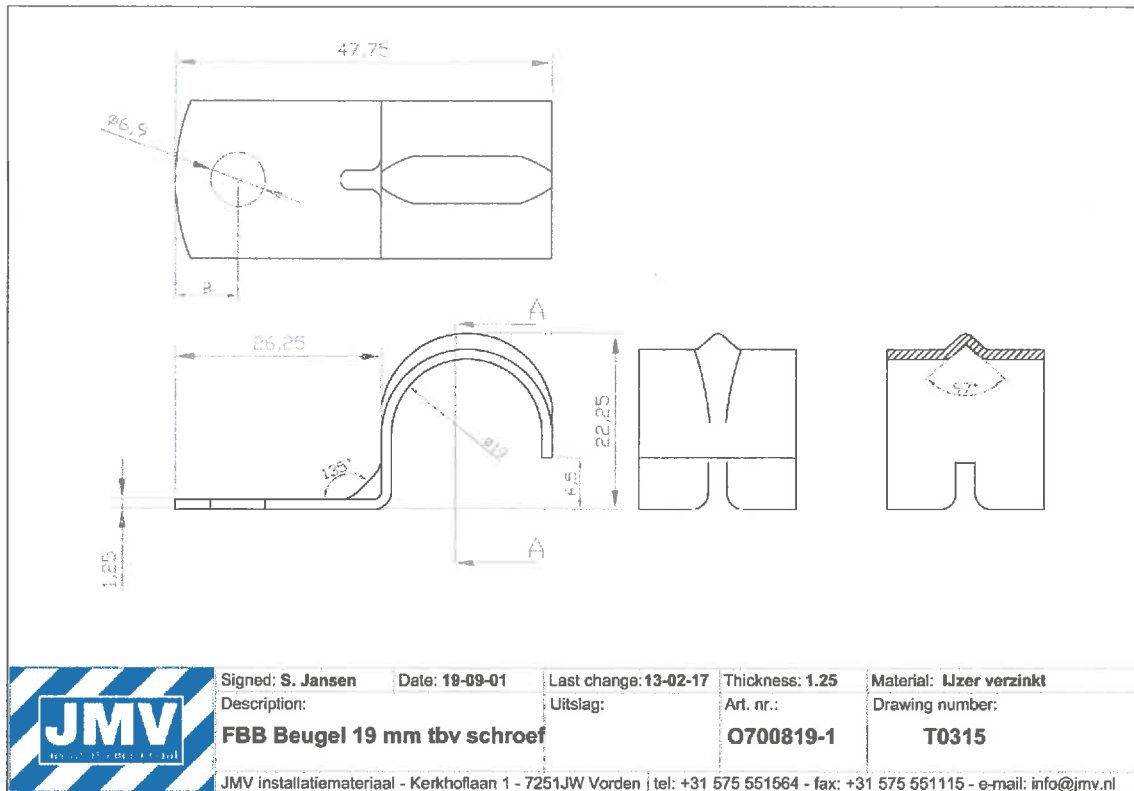
"E 30", "E 60" or "E 90"  
according to DIN 4102-12:1998-11

Cable clamps "FFB"

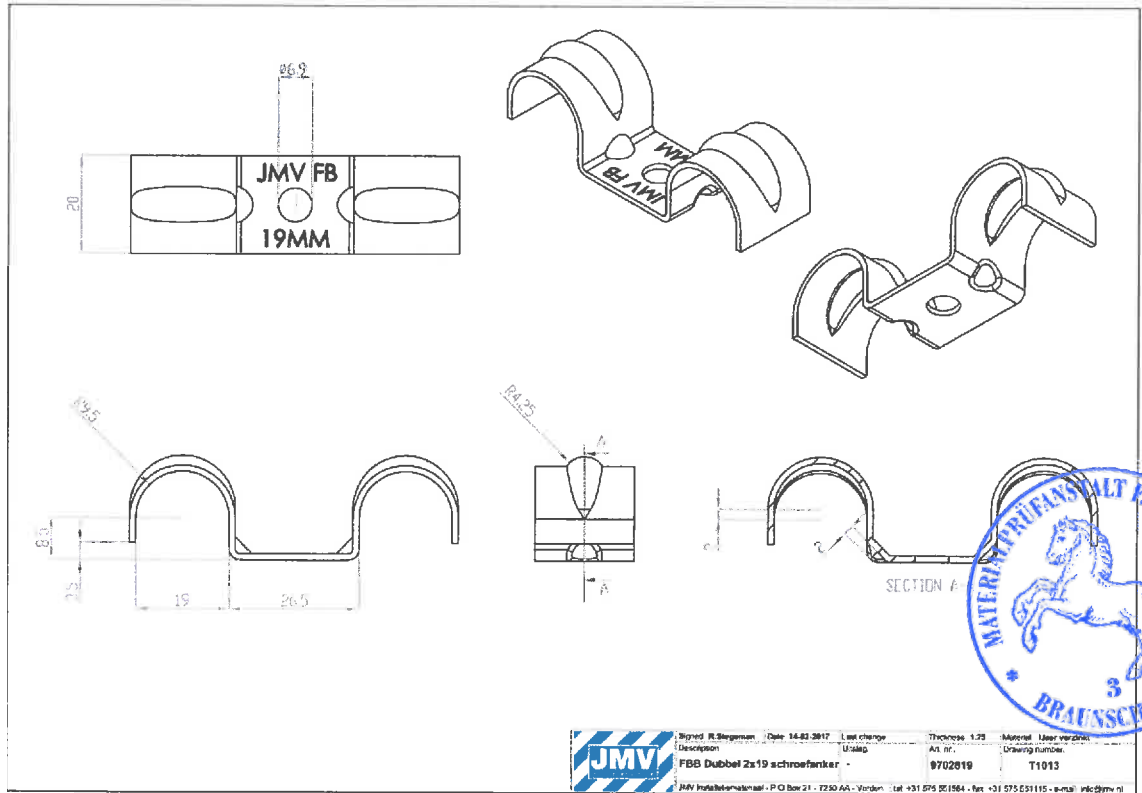
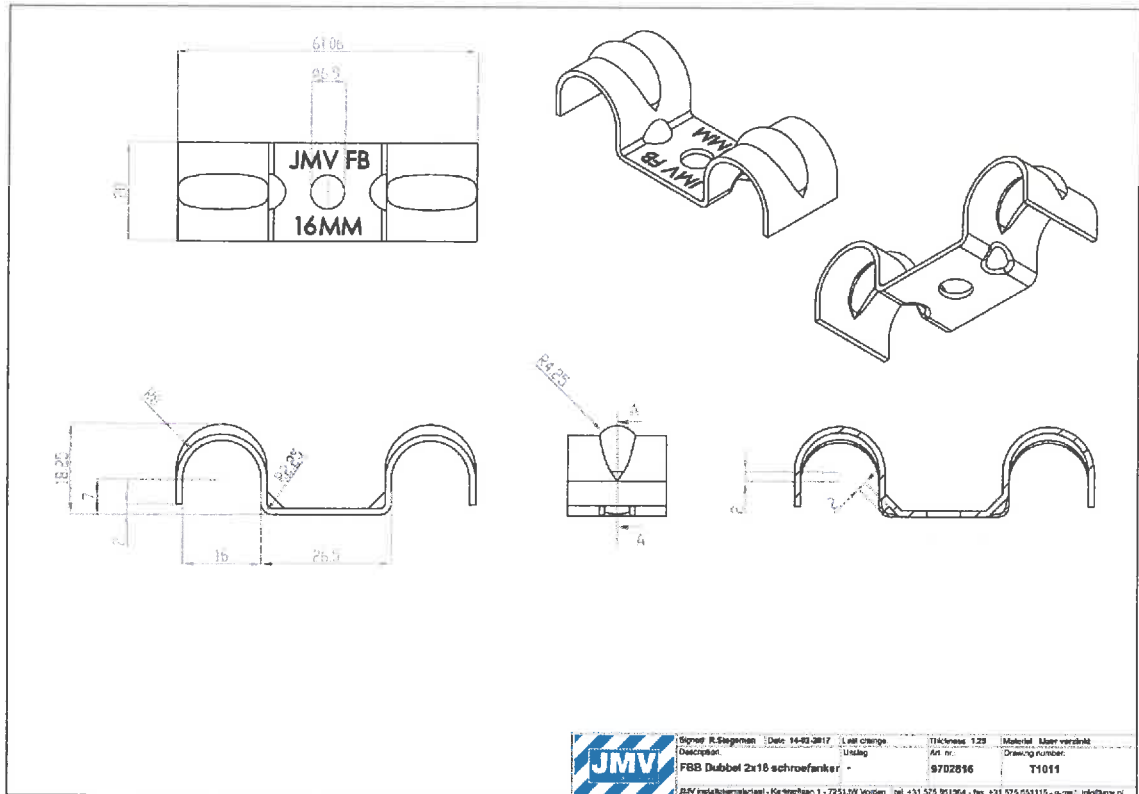
Annex 6 to

abP number  
P-3637/913/11-MPA BS issued

on 09 June 2017



<p>Cable systems with integrated functional integrity</p> <p>“E 30”, “E 60” or “E 90” according to DIN 4102-12:1998-11</p> <p>Cable clamps “FFB”</p>	<p>Annex 7 to</p> <p>abP number P-3637/913/11-MPA BS issued</p> <p>on 09 June 2017</p>
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Cable systems with integrated functional integrity  
"E 30", "E 60" or "E 90"  
according to DIN 4102-12:1998-11

Cable clamps "double clamp"

Annex 8 to

abP number  
P-3637/913/11-MPA BS issued

on 09 June 2017