

## SAFETY EQUIPMENT

### INSULATING PROTECTIVE SHUTTERS

DIN VDE 0682 Part 552



Inserting an insulating protective shutter, type A1, by hand.

According to the five safety rules, adjacent parts are energised parts situated in the vicinity zone. If parts of an electrical installation close to the work location cannot be isolated, additional safety measures have to be taken before working in the vicinity of live parts.

Insulating protective shutters according to DIN VDE 0682 Part 522 are used for protection against accidental contact with energised parts. The shutters are portable and are inserted by hand or by using an operating rod when parts of the installation are connected to supply voltage. They are designed for short-term use in electrical indoor installations according to DIN VDE 0101 with supply voltages from 1 kV to 36 kV a.c. and nominal frequencies below 100 Hz for protection against direct contact according to DIN VDE 0105 Part 100 when working in the vicinity of live parts.

Insulating protective shutters may require modifications when used in medium voltage systems. In some cases, it may not be possible to insert the shutters in the live working zone without risk due to unfavourably located switchgear drives, switching components or isolating plates. These problems can be resolved in accordance with the standard by matching cut-outs and pre-cutting the protective shutters. In these cases we require technical details from our customers. For this purpose, we have developed a special template for insulating protective shutters. This template can be used and to mark the exact location of the cut-outs.


#### Range of services

When retrofitting systems, measurements have to be taken on site. For operational reasons these measurements are carried out under live conditions since the system should not be isolated.

To provide adequate protection during insertion of the protective shutters and when the shutters are inserted, it is normally necessary to install new guide rails and supports for the protective shutters. If you do not have the qualified staff available on site for this type of work, we would be pleased to assist you with measurements (even under live conditions), adjusting (reworking) complex shutter arrangements and with the installation of guide rails and supports.

## Insulating Protective Shutters

### Rated voltages from 1 kV to 36 kV

- For indoor installations only 
- Protection against accidental contact with live parts of the installation with rated voltages of 1 kV to 36 kV
- Four different designs allow for use in almost all types of switchgear installations
- Retrofitting of insulating protective shutters (even under live conditions) into systems can be provided as a service

Please request the above mentioned template when placing your order or download it from our website [www.dehn.de](http://www.dehn.de):

**DEHN form No. 2090 for shutters made of rigid PVC**  
(see chapter "Index")

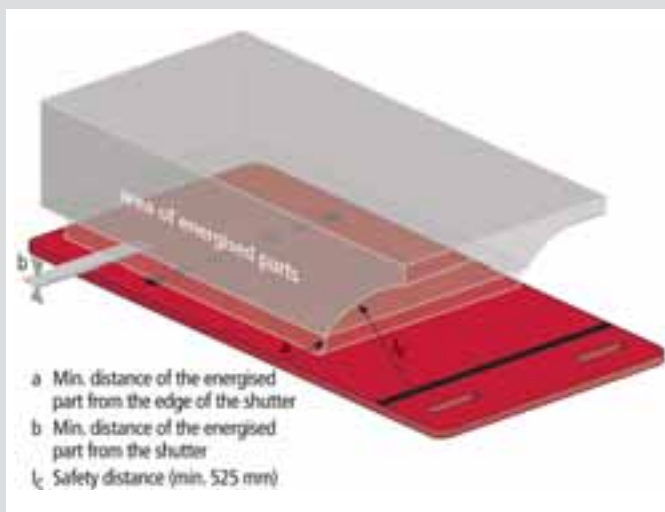
Four different designs are available:

- Type A1, with finger holes, guide and limit marks for insertion by hand on guide rails
- Type A2, with angled handles (90°) and grips for insertion by hand on guide rails
- Type A3, with supporting device (bayonet pin) for insertion on guide rails using an operating rod
- Type A4, with finger holes for insertion by hand for use in factory assembled switchgear installations



## Example of the Live Working Zone Rated voltages 1 kV up to 36 kV

## SAFETY EQUIPMENT INSULATING PROTECTIVE SHUTTERS



Live working zone of an insulating protective shutter type A1 (Example)

Rated voltage $U_r$	Minimum distance of the live part	
	from shutter edge a	from shutter b
3.6 kV	60 mm	0 mm
7.2 kV	90 mm	0 mm
12.0 kV	120 mm	20 mm
24.0 kV	220 mm	60 mm
36.0 kV	320 mm	100 mm

### Note

Insulating protective shutters are not designed for securing against reconnection. The protected area is the area which is separated by the insulating protective shutter from the area containing live parts of the installation. The shutter and shutter edge must maintain the minimum safety distances from energised parts as indicated in the table.

The protective part (with length  $l_s$  and, if required, height  $h_s$ ) of insulating protective shutters is the part that provides protection from accidental contact with live parts. It is fitted with either a handle or a coupling unit for attaching it to an operating rod.

Outside of the area enclosing the live parts, gaps between shutter edge and cell wall are permissible as follows:

- Up to 10 mm without restriction
- Up to 40 mm, if the distance between the shutter edge and the live working zone is at least 100 mm
- Up to 100 mm within the area of a switch subconstruction

# SAFETY EQUIPMENT

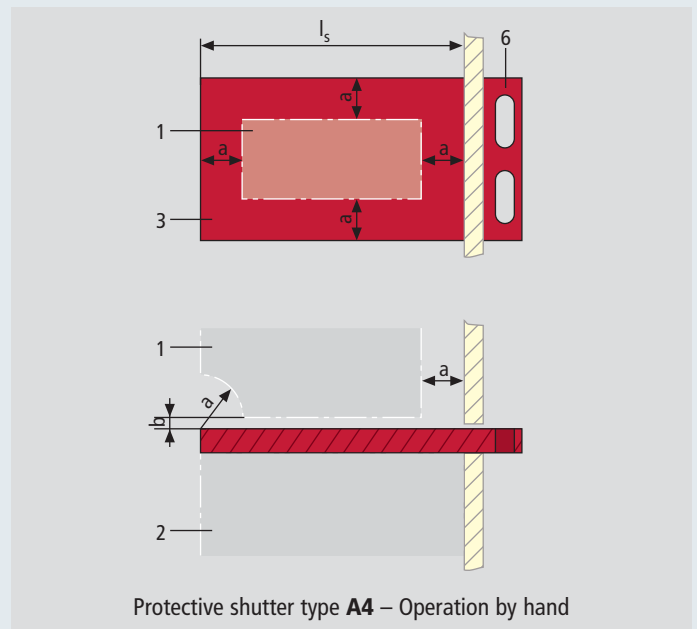
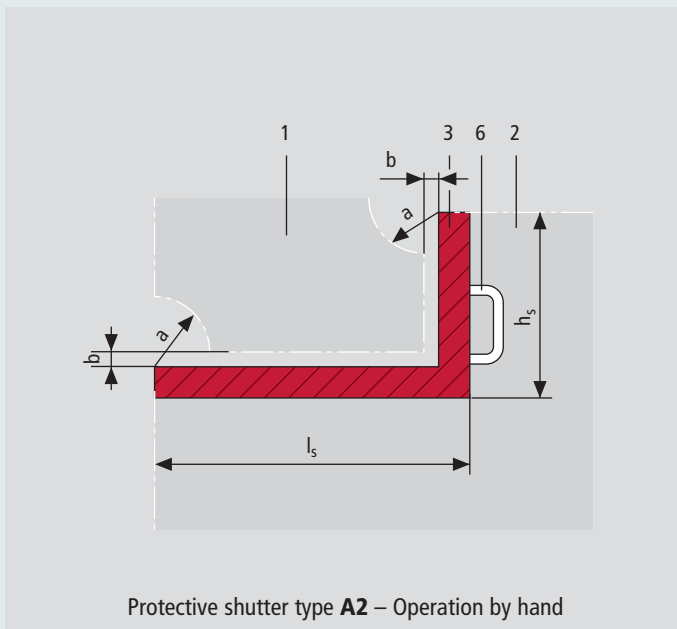
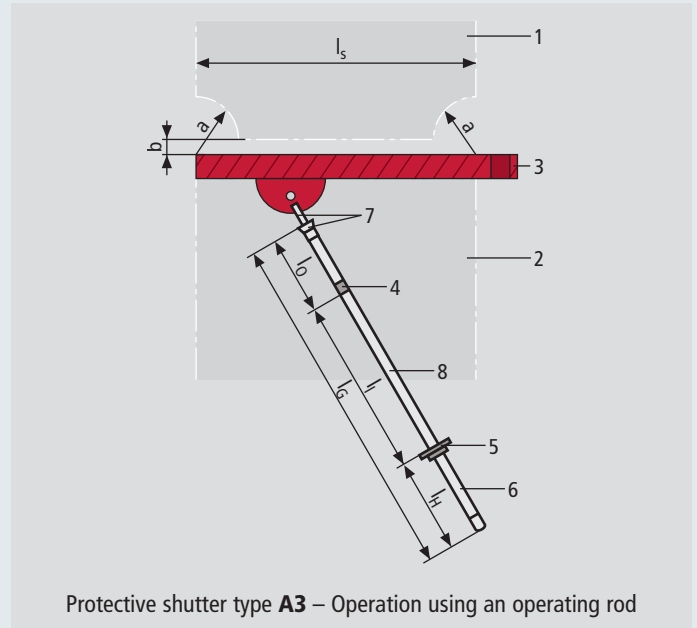
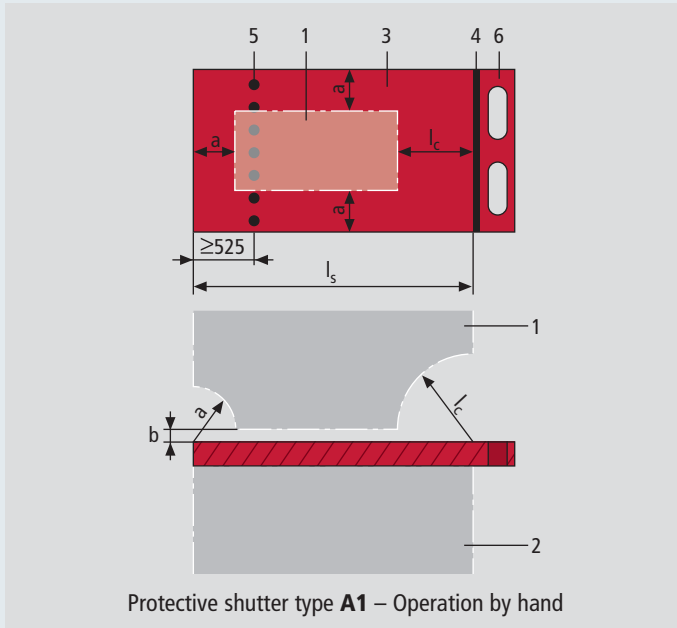
## INSULATING PROTECTIVE SHUTTERS

### Designs

### Rated voltages 1 kV up to 36 kV

Due to the variety in design of existing switchgear installations, DIN VDE 0682 Part 552 defines four basic types of protective shutters:

- Type **A1**, with finger holes, guide and limit marks for operation by hand on guide rails
- Type **A2**, with angled handles (90°) and grips for operation by hand on guide rails
- Type **A3**, with supporting device (bayonet pin) for operation on guide rails using an operating rod
- Type **A4**, with finger holes for operation by hand, for use in factory assembled switchgear installations



- |   |   |   |
|---|---|---|
| 1 Live working area   | $l_G$ Total length of the operating rod                     | a Minimum distance of live parts from insulating shutter edge |
| 2 Protected area  | $l_0$ Length of the upper section of the operating rod      | b Minimum distance of live parts from insulating shutter      |
| 3 Protective section with length $l_s$ (and height $h_s$ )  | $l_H$ Length of the handle of the operating rod             |   |
| 4 Limit mark or red ring                                    | $l_1$ Length of the insulating element of the operating rod |   |
| 5 Guide mark or handguard                                   | $l_2$ Length of the handle of the operating rod             |   |
| 6 Handle  | $l_s$ Length of the protective section                      |   |
| 7 Coupling  | $l_c$ Protection distance                                   |   |
| 8 Insulating element of the operating rod with length $l_1$ |   |   |

## Insulating Protective Shutters, Types A1 and A2

Rated voltages 1 kV up to 36 kV

## INSULATING PROTECTIVE SHUTTERS



Inserting an insulating protective shutter, type A1, by hand.

Type	Rated voltage $U_r$	Material	Part No.
<b>A Type A1</b>			
With finger holes, guide and limit mark for inserting and removing insulating protective shutters on / from guide rails by hand.			
The guide mark is a dotted line with a minimum distance of 525 mm from the rear shutter edge. This mark must not be surpassed when inserting the shutter.			
The limit mark is a continuous line and indicates the limit of the handle from the protective section. This mark must not be exceeded when inserting the shutter and must be at least 525 mm away from live parts when the shutter has been inserted.			
ISP 36 PVC A1...	36 kV	rigid PVC	763 211

When placing your order, please fill in the template on pages 253-255 (DEHN Form No. 2090) and fax it to DEHN + SÖHNE.

The template can also be downloaded from the Publications area of the DEHN + SÖHNE website [www.dehn.de](http://www.dehn.de).

Guide rails and further accessories are also listed in the above mentioned form.



Inserting an insulating protective shutter (transparent), type A2.

<b>B Type A2</b>			
With angled handle (90°) and hand grips for inserting or removing insulating protective shutters on / from guide rails by hand. Other angled handle (70° ... 270°) are available on request.			
The height of the handle has to be defined to ensure that energised parts of the installation situated above the shutter are completely covered.			
ISP 36 PVC A2...	36 kV	rigid PVC	763 221

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## SAFETY EQUIPMENT

## Insulating Protective Shutters, Types A3 and A4

### INSULATING PROTECTIVE SHUTTERS

### Rated voltages 1 kV up to 36 kV

Type	Rated voltage U <sub>r</sub>	Material	Part No.
<b>C Type A3</b>			
ISP 36 PVC A3...	36 kV	rigid PVC	<b>763 231</b>

#### C Type A3

With supporting device (bayonet pin) for inserting and removing insulating protective shutters on / from guide rails using an operating rod.

This shutter type is also available with a slot and a supporting device (rotatable shutter). The shutter is operated using an operating rod with switching rod head.

Two persons are required for installing shutter sizes exceeding 1 m<sup>2</sup>. For this purpose two operating rod couplings are required.

Moreover, the shutter can also be provided with rolls for easier handling.



Inserting an insulating protective shutter, type A3, by operating rod

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Operating rod with T pin shaft (bayonet type) and coupling with T pin shaft at the insulating protective shutter.

#### D Type A4

With finger holes (without additional marks) for use in factory assembled switchgear panels. Instead of the finger holes, the shutters can also be provided with a grip (minimum height: 35 mm).

The shutter is inserted into the closed installation through a slot.

The protection device of the installation must ensure full protection when inserting and removing the shutter.

In type-tested switchgear installations according to DIN VDE 0670 Parts 6 and 7 or EN/IEC 62271-200 (DIN VDE 0671 Part 200), insulating protective shutters may only be used after consulting with the manufacturer of the switchgear installation

ISP 36 PVC A4...	36 kV	rigid PVC	<b>763 241</b>
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Inserting an insulating protective shutter, type A4.