



DE

Einbau- und Wartungsanleitung Ein- und zweiflügelige Stahltüren

DEUTSCH 3



..... **8**


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 8


Sehr geehrte Kundin, sehr geehrter Kunde,
wir freuen uns darüber, dass Sie sich für ein Produkt aus
unserem Hause entschieden haben.

1 Zu dieser Anleitung

Bitte lesen und beachten Sie diese Anleitung. Sie gibt Ihnen wichtige Informationen zu Einbau, Wartung und Pflege Ihrer Stahltür und ist ein wichtiges Dokument für die Bauakte. Sprechen Sie mit unserem Kundendienst, wenn Sie nach dem Durcharbeiten dieser Anleitung noch Fragen haben.

1.1 Verwendete Warnhinweise

 Das allgemeine Warnsymbol kennzeichnet eine Gefahr, die zu **Verletzungen** oder **zum Tod** führen kann. Im Textteil wird das allgemeine Warnsymbol in Verbindung mit den nachfolgend beschriebenen Warnstufen verwendet. Im Bildteil verweist eine zusätzlich Angabe auf die Erläuterungen im Textteil.

 **GEFAHR**

Kennzeichnet eine Gefahr, die unmittelbar zum Tod oder zu schweren Verletzungen führt.

1.2 Verwendete Symbole



2 Sicherheitshinweise

GEFAHR

Lebensgefahr beim Einbau der Stahltür

Beim Einbau kann die Tür oder der Türrahmen umfallen und dabei Personen erschlagen.

- ▶ Sichern Sie Tür und Zarge vor und während der Montagearbeit gegen Umfallen.
- Setzen Sie nur qualifiziertes und unterwiesenes Personal für Montage und Wartung ein.
- Lassen Sie Elektroarbeiten nur von ausgebildeten Fachkräften durchführen.
- Führen Sie keine Veränderungen durch An- und Umbauten durch, die die Sicherheit beeinträchtigen können.
- Schließen Sie die Gefahr durch Feuer, Gas, Staub, Dampf, Rauch, Brand und Explosion bei Schweiß, Brenn- und Schleifarbeiten aus.
- Vermeiden Sie, dass bei Schweißarbeiten aufschäumende Baustoffe durch Wärmeeintrag reagieren und dadurch ihre Wirkung verlieren.

3 Informationen zu den Türeigenschaften

Beachten Sie, dass die Tür einzelne Eigenschaften, eine Kombination aus den Eigenschaften Feuerschutz, Rauchschutz, Schallschutz und Einbruchschutz erfüllen kann oder eine Funktionstür sein kann.

3.1 Feuerschutz- und Rauchschutztüren

- Die jeweilige Zulassung können Sie unter www.hoermann.de/dokumentation/zulassungsbescheide-fuer-feuerschutzabschluesse/ einsehen. Die Zulassung muss an der Verwendungsstelle vorliegen.
 - Die angegebenen Informationen sind Mindestanforderungen für den Einbau in Deutschland. Bei Einbau in anderen Ländern gelten die jeweiligen nationalen Zulassungen, wobei die Materialkennwerte mindestens der DIN zugrunde gelegt werden müssen.
 - Beachten Sie die DIN 18093 (Einbau von Feuerschutz-türen) und die DIN 18100 (Wandöffnungen für Türen) bzw. die länderspezifischen Vorschriften.
 - Der Hersteller kann in Einzelfällen nach § 22 und § 23 der Musterbauordnung eine Übereinstimmungserklärung ausstellen.
 - **Der Betreiber ist für den einwandfreien Zustand der Tür verantwortlich.**
 - In Deutschland dürfen Federbänder an Türen und Klappen mit folgenden Eigenschaften **nicht** verwendet werden:
 - Flügelgewicht > 80 kg
 - Verglasung
 - Einbau in Montagewände (Ausnahme: Maße < 1000 × 1000 mm)
 - Kombination als Rauchschutztüren nach DIN 18095
 - 2-flügelig
- Außerhalb Deutschlands können andere Vorschriften gelten, allerdings empfehlen wir die Einhaltung der deutschen Vorgaben.
- Verwenden Sie Beschläge, Schösser, Schließmittel und Elektroanbauteile nur, wenn sie Bestandteil der Türzulassung sind oder eine Freigabe des Herstellers vorliegt.

- Bauen Sie 3-seitig gefälzte Türen ohne unteren Schachtabschluss, in Schächten auf unterstem Bodenniveau ein.
- Gipskartonwände und Wanddicken: siehe Tab. 1:
- Zulässige Wände und Wanddicken: siehe Tab. 2:
- Hinterfüllen Sie die Zarge mit mineralischem Mörtel auf Zementbasis, z.B. LM21 von Sakret, wenn es in der Einbausituation nicht anders beschrieben wird. Spreizen Sie U-Zargen und Eckzargen (mit und ohne Gegeizargen) vor dem Hinterfüllen ab, damit sie sich durch den Druck des Mörtels nicht verbiegen.
- **Rauchschutz:**
 - Verwenden Sie Bodendichtungen und Dichtungskeile (siehe Bildteil Punkt 10.6 und 11).
 - Versiegeln Sie den Zargenanschluss zu den angrenzenden Bauteilen beidseits und lückenlos dauerelastisch, wenn die Zarge nicht mit Mörtel hinterfüllt ist.
 - Verwenden Sie einen Schließzylinder.
- Setzen Sie Verglasungen von Feuerschutz-türen keiner direkten Sonnenstrahlung aus.

Tab. 1: Zulässige Gipskartonwände nach ABP und Mindestwanddicken für Feuerschutz- und Rauchschutztüren (mm)

| Gipskartonwände ¹⁾ | T30 ⁶⁾ | T60 ⁶⁾ | T90 ⁶⁾ | Prüfzeugnis Nr. |
|-------------------------------|-------------------|--|-------------------|----------------------------------|
| Knauf W112, F90 | 100 | 100 ²⁾ 125 ³⁾ | 125 ⁵⁾ | P-3310/563/07-MPA BS |
| Knauf W131 | 116 ⁴⁾ | 116 ⁴⁾ | 177 | P-3391/170/08-MPA BS |
| Knauf W132 | 161 ⁴⁾ | 161 ⁴⁾ | 161 | P-3391/170/08-MPA BS |
| Knauf W352 | 100 | 100 ²⁾ 150 ³⁾ | 150 | P-3202/2028-MPA BS |
| Rigips 3.40.04 | 100 | – | 125 ⁵⁾ | P-3956/1013-MPA BS |
| Rigips 3.60.20 | 100 | 100 ²⁾ 125 ³⁾ | 125 | P-MPA-E-99-184 |
| Rigips SB, F90-A, 6.70.10 | 165 ⁴⁾ | 165 ⁴⁾ | 165 | P-3020/0109-MPA BS |
| Rigips TB, F90-A | 130 ⁴⁾ | 130 ⁴⁾ | 130 | P-3021/0119-MPA BS |
| Fermacell 1S 31, F90-A | 95 | – | 145 | P-3854/1372-MPA BS |
| Fermacell 1S 35, F90-A | – | – | 140 | P-3365/2559-MPA BS |
| Fermacell 4S 31 | 176 ⁴⁾ | 176 ⁴⁾ | 176 | P-3358/2489-MPA BS |
| Lafarge Gips L14 | 100 | – | 125 ⁵⁾ | P-MPA-E-99-020 P-MPA-E-99-021 |
| Lafarge Gips L15 | 100 | 100 ²⁾ 125 ³⁾ | 125 | P-MPA-E-98-005 |
| Lafarge Gips L16 | 150 ⁴⁾ | 150 ⁴⁾ | 150 | P-3515/0519-MPA BS |
| Lafarge Gips L18 | 161 ⁴⁾ | 161 ⁴⁾ | 161 | P-3391/0890-MPA BS |
| Promat F90-A | 140 ⁴⁾ | 140 ⁴⁾ | 140 | P-MPA-E-99-047 |

1) Siehe Tab. 2:

2) 1-flügelig

3) 2-flügelig

4) keine Nutzung als Brandwand

5) **Bild 9 / D4** und **Bild 9 / D8** beachten

6) 1-flügelig und 2-flügelig: e ≤ 2500 und k ≤ 2500; siehe 4.2

3.2 Schallschutztüren

- Die gesamte Schalldämmung ist von den umgebenden Bauteilen abhängig. Die resultierende Schalldämmung von Wand und Tür müssen Sie gesondert nachweisen, da sie nicht aus dem bewerteten Schalldämmmaß R_w bzw. R der Tür allein abgeleitet werden kann.
- Achten Sie auf vollständig anliegende Dichtung(en).
- Der Boden muss glatt sein, damit die vollständige Dichtfunktion der Bodendichtung gewährleistet ist.
- Trennen Sie den Estrich im Schwellenbereich.
- Verwenden Sie Dichtungskeile und Bodendichtung (siehe Bildteil Punkt 10.6 und 11).
- Verwenden Sie einen Schließzylinder.
- Hinterfüllen Sie die Zarge vollständig mit Mörtel.

Tab. 2: Zulässige Wände und Mindestwanddicken für Feuerschutz- und Rauchschutztüren (mm) siehe 4.2

| Wand | H3D H_30 B | H3-1 H_30 C-1 H_30 D-1 | H3-2 H_30 C-2 H_30 D-2 (VM) | H6-1 H_60 D-1 | H6-2 H_60 D-2 | H16-1 | H16-2 | H16-S1 H_90 E-1 | HBS C | HBS D |
|--|---------------------------------------|---------------------------------------|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--------------------|-------|-------|
| Stahltür | | | | | | | | | | |
| Beton DIN 1045-1, Festigkeitsklasse \geq C12/15 | - | e \leq 1250 und k \leq 2500 | e \leq 2500 und k \leq 2500 | e \leq 1250 und k \leq 1750 | - | e \leq 625 und k \leq 750 | - | - | - | - |
| Mauerwerk DIN 1053-1, Steinfestigkeit \geq 12, Mörtelgruppe \geq 2 | - | e \leq 1250 und k \leq 2500 | e \leq 2500 und k \leq 2500 | e \leq 1250 und k \leq 1750 | - | e \leq 625 und k \leq 750 | e \leq 2500 und k \leq 2500 | - | - | - |
| Porenbeton-Block oder Platten , DIN 41165-3, Festigkeitsklasse \geq 4, Porenbetonplatten nach allgemeiner bauaufsichtlicher Zulassung, Festigkeitsklasse \geq 4.4 | 115 | 115 | 115 | 115 | 175 | 115 | 175 | 240 | 215 | 240 |
| Montagewand F90-A nach ABP, Bild 9D beachten, max. Höhe 5000 mm | - | e \leq 1250 und k \leq 2500 | e \leq 2500 und k \leq 2500 | e \leq 1250 und k \leq 2500 | - | e \leq 1250 und k \leq 2500 | e \leq 2500 und k \leq 2500 | - | - | - |
| Montagewand F90-A DIN 4102-4/Tab. 48, Bild 9D beachten, max. Höhe 5000 mm | - | - | H3-2 H_30 C-2 e \leq 2500 und k \leq 2500 | e \leq 1250 und k \leq 2500 | e \leq 2500 und k \leq 2500 | e \leq 1250 und k \leq 2500 | e \leq 2500 und k \leq 2500 | - | - | - |
| Montagewand F90-B DIN 4102-4/Tab. 49, Bild 9D beachten, max. Höhe 5000 mm | 100 | 100 | 100 | 100 | 125 | 125 | 125 | - | 125 | - |
| Montagewand F30-A | - | 130 | 130 | - | - | - | - | - | - | - |
| Gips-Wandbauplatten VG Orth, P-SAC 02 / III-468, Bild 9/E1 beachten | e \leq 1125 und k \leq 2125 | - | - | - | - | - | - | - | - | - |
| Mindestwanddicken | 100 | - | - | - | - | - | - | - | - | - |

siehe Tab. 1:

3.3 Einbruchschutztüren

- Die Tür erfüllt ihre Einbruchschutzeigenschaften nur, wenn der Riegel komplett vorgeschlossen und der Schlüssel abgezogen ist.
- Sichern Sie die Türblätter an RC4/B Türen und an allen 2-flügeligen RC - Türen an den Bändern mit je zwei Schrauben (siehe Bildteil Punkt 8.4b und 10.2).
- Verwenden Sie nur Eckzargen, Eckzargen mit Gegenzarge und U - Zargen.
- Hinterfütern Sie an RC2/N Türen die Zarge im Bereich der Verriegelungspunkte, Bänder und Sicherungsbolzen druckfest.
- Hinterfütern Sie an RC3/A und RC4/B Türen die Zarge umlaufend druckfest.
- Montieren Sie an Türen mit Gläsern den Glashalterahmen mit Sicherungsglasen auf der Angriffsseite.
- Montieren Sie die Hinterklotzung bei Austausch der oberen Verglasung wie vor der Montage.
- Messen Sie bei 2 - flügeligen Türen die unteren Spaltmaße von der Bodenmulde.
- Erschweren Sie bei Antipaniktüren den Eingriff mit Draht z.B. durch geringe Bodenluft oder Verwendung einer Flachrundschwelle.
- Füllen Sie die Zargen von RC2 Türen kpl. mit Mörtel aus, wenn sie in F90A Montagewände eingebaut werden.

3.3.1 Mindestanforderungen an einbruchhemmende Türen

| Widerstandsklasse nach DIN EN V 1627 / DIN EN 1627 / VDS | RC2 / N | RC3 / A | RC4 / B |
|--|------------------------|-----------|----------|
| Mauerwerk DIN 1053 Teil 1 (mm) | 115 | 115 | 240 |
| Stahlbeton, mind. C12 / 15 (mm) | 100 | 120 | 140 |
| Porenbetonsteine Klasse 4 (mm) | 175, 115 ¹⁾ | 300 | - |
| Porenbetonplatten Klasse 4 (mm) | 150 | - | - |
| Montagewand F90 A | ✓ | - | - |
| Profilylinder nach DIN 18252 ³⁾ | P2BS | P2BS | P3BS |
| Profilylinder ^{2) 3) 4)} | Klasse A | Klasse A | Klasse B |
| Schutzbeschlag nach DIN 18257 ³⁾ | ES1 (ZA) | ES2 (ZA) | ES3 (ZA) |
| Schutzbeschlag ^{2) 3)} | Klasse A | Klasse A | Klasse B |
| Gläser EN 356 (Feuerschutz) | P4A | P6B / P7B | - |

- 1) nur 1-Flügliger, wir empfehlen Wanddicken ab 150 mm
- 2) für VdS anerkannte Türen
- 3) Schutzbeschlag oder Profilylinder muss mit Ziehschutz (ZA) ausgeführt sein.
- 4) nicht zwingend im Lieferumfang enthalten

3.4 Funktionstüren

Die Zargen müssen nicht zwingend hinterfüllt werden.

3.5 Feuerschutz und Außenanwendung

Feuerschutz und Außenanwendung bedarf einer eigenen Zulassung. Beachten Sie die separate Einbauanleitung Art- Nr. 479166.

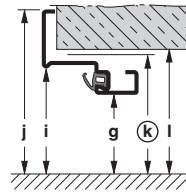
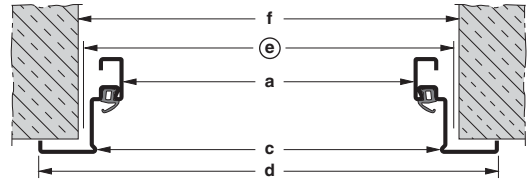
4 Montage

4.1 Vor der Montage

Klären Sie vor der Montage folgende Fragen:

- Welche Eigenschaften hat die Tür?
- Ist die Wandbauart zum Einbau der Tür geeignet?
- Ist die Höhenlage des Bodens bekannt (Meterriss)?
- In welche Richtung soll die Tür öffnen?
- Sind Bauvorschriften zu beachten?
- Muss die Wand im Bereich der Mauerschutzkästen ausgestemmt werden?

4.2 Maße



$a = e - 82$ $g = k - 42$
 $c = e - 36$ $i = k - 19$
 $d = e + 64$ $j = k + 31$
 $f = e + 10$ $l = k + 5$

Abb. 1: Maße

- a / g lichte Öffnungsweite / -höhe
- c / i lichte Falzbreite / -höhe
- d / j Zargenaußenmaßbreite / -höhe
- e / k Baurichtmaßbreite / -höhe
- f / l lichte Rohbaumaßbreite / -höhe EN 12519

4.3 Bei der Montage

- Beachten Sie die Einbauhinweise in den Zubehörpaketen.
- Verwenden Sie Montagebauteile, wenn sie mitgeliefert werden, z.B. Dübellaschen, Dübel oder Schrauben.
- Verwenden Sie die unter Punkt 8 angegebenen Dübel und beachten Sie die Montagehinweise in der Dübelzulassung, siehe Internetseiten der Dübelhersteller.
- Beachten Sie, dass bei Zargen ohne Bodeneinstand der untere Montagewinkel vor der Montage entfernt werden muss.

4.4 Hinweise zum Bildteil

| siehe Punkt | Beschreibung |
|-------------|--|
| 8 | Übersicht der Einbausituationen A = Einbau in Mauerwerk / Beton B = Einbau in Mauerwerk / Beton sichtbar C = Einbau in Porenbeton D = Einbau in Gipskarton / Leichtbau E = Einbau in Gips-Wandbauplatten |
| 8.1 | Dünn- und Dickfalz |
| 8.2 | Zargenformen |
| 8.3a / 8.3b | Anzahl der Befestigungspunkte |
| 8.3c | Einbauablauf |
| 8.4a | Ausbau der Standardtür |
| 8.4b | Ausbau der Sicherheitstür |
| 8.5 | Zusammenbau der Eckzarge |
| 8.6 | Bodenmulde und Montagewinkel |
| 8.7 | Befestigungsteile |
| 8.8 | Minimaler Randabstand und Spreizrichtung Dübel |
| 8.9 | Einbau Schattennutprofile |
| 8.10 | Leerrohre in der Zarge |
| 8.11 | Einsetzbare E - Öffner |
| 8.12 | Mauerschutzkästen in GKF - Wände |
| 9.0 | Einbausituationen |
| 10.1a | Einbau mit Standardbändern |
| 10.1b | Einbau mit 3D - Bändern |

| siehe Punkt | Beschreibung |
|-------------|---|
| 10.2 | Einbau der Sicherheitstür |
| 10.3 | Einstellen der Luftspalte |
| 10.4 | Entfernen der Bodenwinkel bei Zargen ohne Bodeneinstand |
| 10.5 | Einbau der Gegenzarge |
| 10.6 | Dichtungskeile mit Silikon befestigen |
| 10.7 | Einbau der Zargendichtung |
| 10.8 | Schließblech abfeilen |
| 10.9 | Anheben der Tür |
| 10.10 | Spannen des Federbandes |
| 10.11 | Umbau Glasrahmen |
| 10.12 | Umbau des Lüftungsgitters |
| 10.13 | Dämmschichtbildner bei Feuer- und Rauchschutz |
| 10.14 | Dämmschichtbildner an Sicherungsbolzen |
| 10.15 | Kennzeichnung großer Glasflächen |
| 10.16 | Paniktüren und RC3/A |
| 10.17 | Einbau Blockschloss bei Mehrfachverriegelung |
| 11 | Bodendichtungen |
| 12 | Türschließer |
| 13.1 | Schlüssel bei Paniktüren abziehen |
| 13.2 | Fehlbedienung des Schlosses vermeiden |

5 Wartung und Pflege

5.1 Jährliche Wartungsarbeiten

- ▶ Kontrollieren Sie Türblatt, Zarge und Befestigung auf mechanische und korrosive Schäden.
- ▶ Kontrollieren Sie die Funktion des Schlosses und fetten Sie ggf. die Falle.
- ▶ Schmieren Sie Bolzenschlösser mit Teflonspray.
- ▶ Kontrollieren Sie die Befestigung der Anbauteile, wie z.B. Drücker, Schloss, Türschließer, Bänder usw.
- ▶ Fetten Sie Bandbolzen und Lagerringe.
- ▶ Kontrollieren Sie die Spaltmaße.
- ▶ Kontrollieren Sie die Sichtbarkeit der Kennzeichnung.



GEFAHR

Lebensgefahr durch abgelöste Dämmschichtbildner

Durch abgelöste Dämmschichtbildner verliert der Feuerschutzabschluss seine Funktion.

- ▶ Ersetzen Sie abgelöste Dämmschichtbildner, siehe Bildteil Punkt 10.13.

- ▶ Tauschen Sie defekte Teile aus.
- ▶ Verwenden Sie nur Original-Ersatzteile des Herstellers.

Wenn Sie Mängel feststellen, die Sie nicht selbst beheben können, beauftragen Sie eine Fachfirma.

5.2 Erforderliche Oberflächenbehandlung für Elemente mit Standardgrundierung

Die Oberfläche von Türblatt und Zarge besteht aus einer Pulvergrundbeschichtung auf Epoxidharz Polyester Basis.

1. Entfernen Sie die Dichtung(en).
2. Schleifen Sie, bis auf die Dämmschichtbildner alle zu lackierenden Oberflächen an.
3. Reinigen Sie die Oberflächen gründlich.

4. Verwenden Sie für die Endbehandlung von Türblatt, Zarge und Dämmschichtbildner folgenden Beschichtungsaufbau:
 - Grundbeschichtung 2K Epoxi Haftgrund und Endbeschichtung mit geeigneten handelsüblichen Bautenlacken oder
 - Grund- und Schlussbeschichtung mit 2K PUR Lack.
 Verwenden Sie bei direkter Sonneneinstrahlung keine dunklen Anstriche. Beachten Sie das BFS Merkblatt Nr. 24 sowie die Verarbeitungshinweise der Lackhersteller und fertigen Sie eine Haftprobe an. Nehmen Sie die Endbehandlung innerhalb von drei Monaten nach Montage vor, um Korrosionsschäden zu vermeiden.
5. Bringen Sie die Dichtung(en) nach dem Trocknen der Farbe wieder an.

5.3 Reinigung

- ▶ Reinigen Sie die Oberflächen mit klarem Wasser oder handelsüblichem Lackreiner.

5.4 Pflege von Edelstahlbauteilen

- ▶ Reinigen und pflegen Sie regelmäßig Bauteile aus Edelstahl mit der bei Hörmann erhältlichen Edel Glanz Edelstahlpflege und tragen Sie diese mit einem weichen Tuch auf.

6 Etikettierung und Kennzeichnung

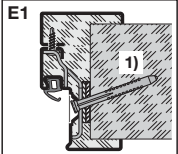
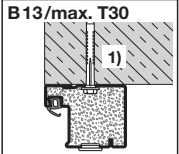
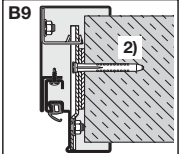
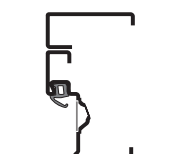
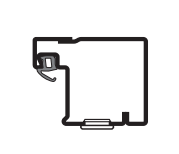
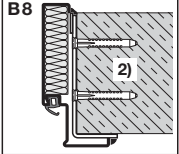
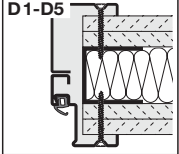
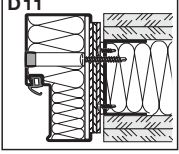
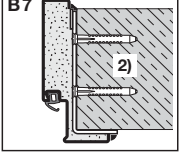
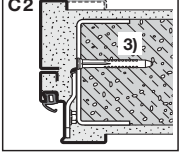
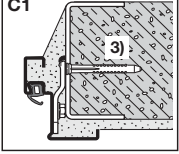
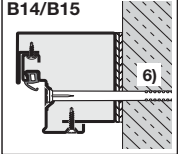
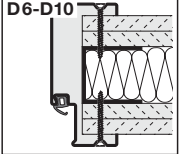
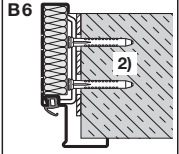
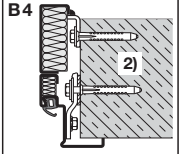
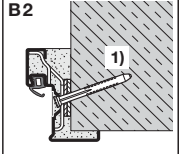
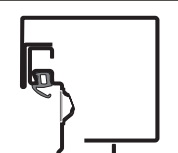
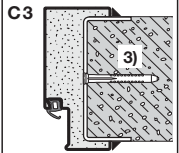
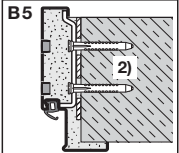
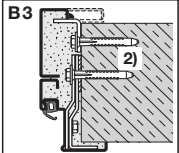
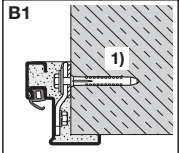
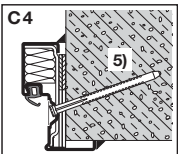
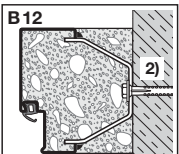
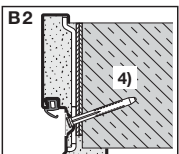
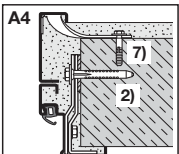
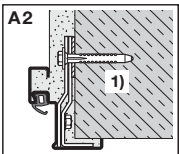
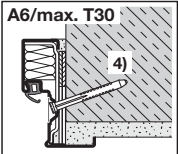
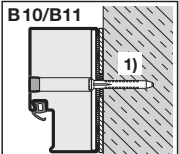
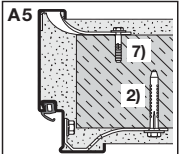
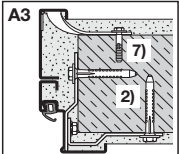
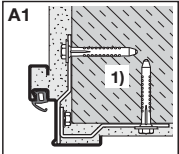
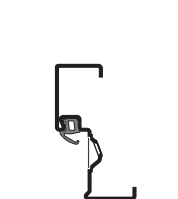
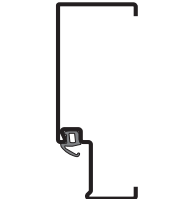
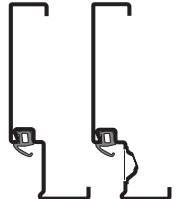
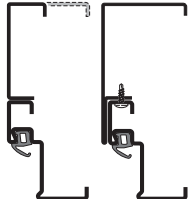
Das Etikett der Türtypen **D45-1, D45-2, D55-1, D55-2, D65-1, D65-2, E45-1, E45-2, E55-1, E55-2, E65-1, E65-2** ist auf Grundlage der Verordnung (EU) Nr. 305/2011 mit dem CE-Konformitätskennzeichen versehen. Die herangezogene und angewandte harmonisierte europäische Produktnorm ist EN 14351-1:2006 + A1:2010 „Fenster und Türen – Produktnorm, Leistungseigenschaften – Teil 1: Fenster und Außentüren ohne Eigenschaften bezüglich Feuerschutz und/oder Rauchdichtheit.“ Die Nummer der zugehörigen CE-Kennzeichnung bzw. Leistungserklärung ist im Falzbereich der Tür auf dem oben genannten Etikett zwischen dem Herstellerlogo und dem CE-Konformitätskennzeichen angegeben.

Türen, auf deren Etikett kein CE-Konformitätskennzeichen abgebildet ist, fallen nicht in den Anwendungsbereich der oben genannten harmonisierten europäischen Produktnorm und dürfen daher nicht über eine CE-Kennzeichnung bzw. Leistungserklärung verfügen.

7 Allgemeines

Die Inbetriebnahme der Tür ist so lange untersagt, bis festgestellt wurde, dass sie nach unseren Vorgaben montiert und auf ihre ordnungsgemäße Funktion überprüft wurde. Bei einer Veränderung des Produkts verliert die Leistungserklärung ihre Gültigkeit.

8 4.3/4.4



- 1) Fischer:** FUR 10 x 80/100
Fischer: SXS 10 x 80/100
Hilti: HRD 10 x 80/100
MEA: MFR 10 x 80/100
Würth: W-UR 10 x 80/100



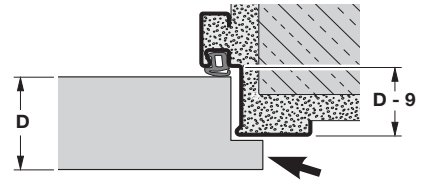
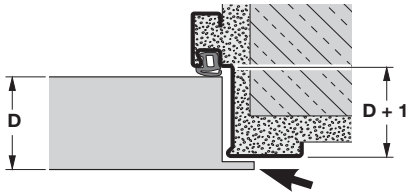
- 2) Fischer:** FUR 10 x 80/100/115
Fischer: SXS 10 x 80/100/120
Hilti: HRD 10 x 80/100
MEA: MFR 10 x 80/100/115
Würth: W-UR 10 x 80/100/115

- 3) Fischer:** FUR 10 x 80/100/115
Fischer: SXS 10 x 80/100/120
Hilti: HRD 10 x 80/100
MEA: MFR 10 x 80/100/115
Würth: W-UR 10 x 80/100/115

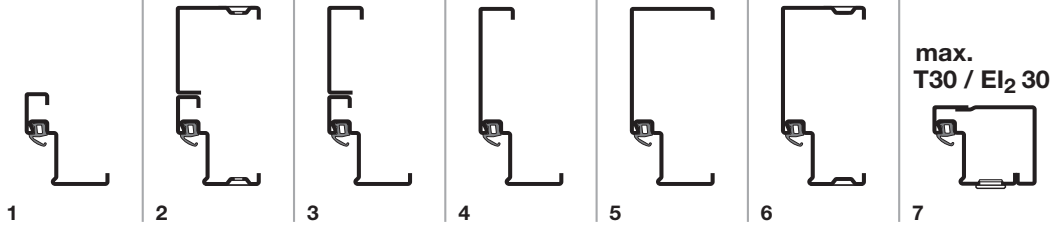
Fischer: GB10 → (T90) (2)

- 4) Fischer:** FUR 10 x 100
5) Fischer: FUR 10 x 160
6) Fischer: FUR 10 x 200
7) 8 x 40

8.1



8.2



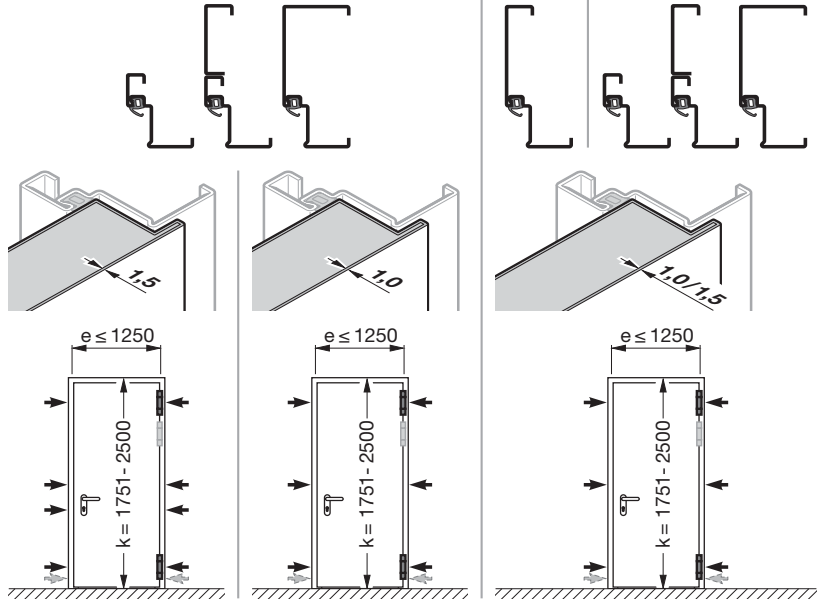
8.3a



4.2/4.3

T60 / EI₂60 / T90 / EI₂90

T30 / EI₂ 30 / HBS

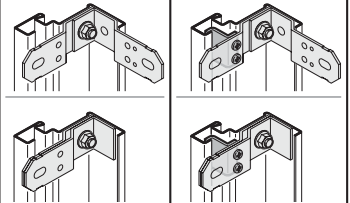


8.7a
8.7b



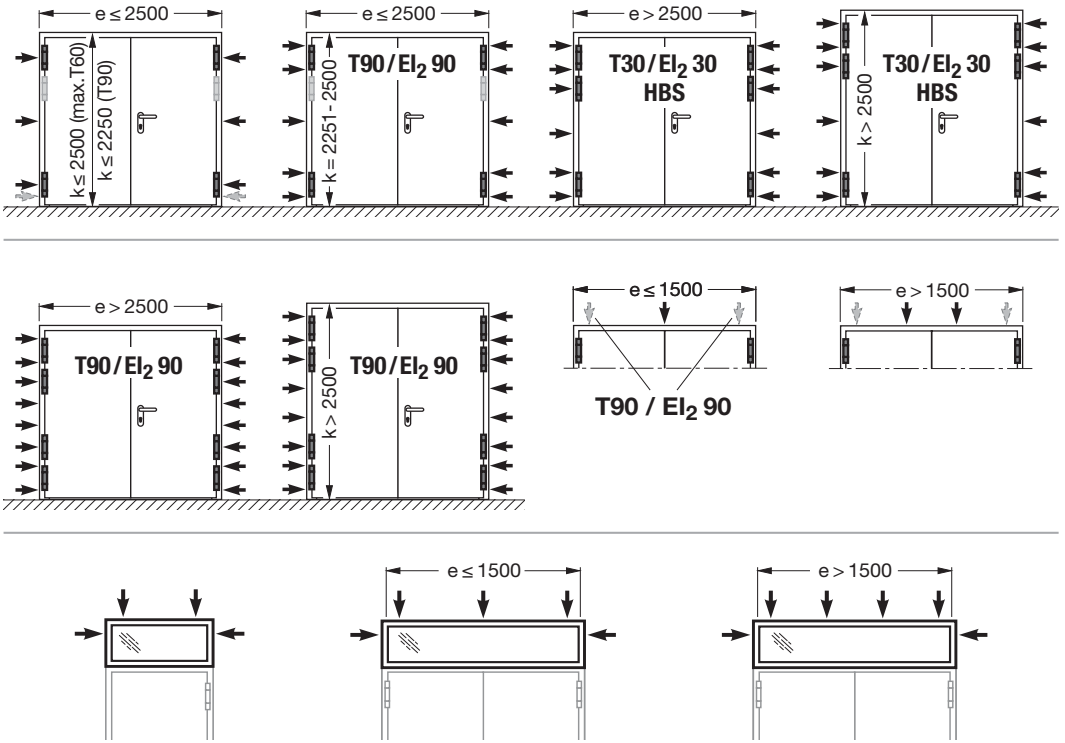
max.
T60 / EI₂ 60

T90 / EI₂ 90

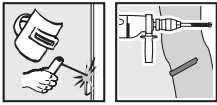


8.3b

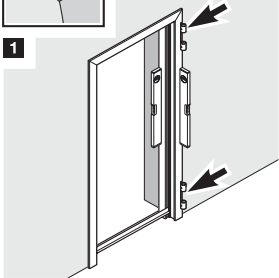
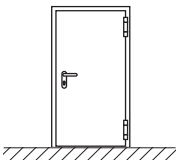
4.2/4.3



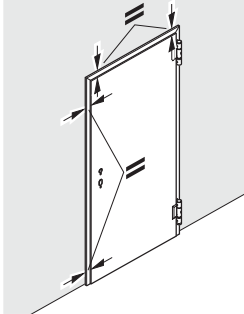
8.3c



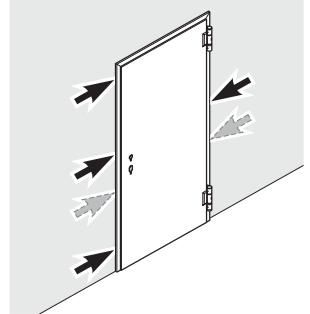
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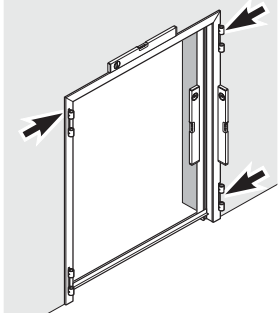
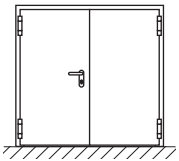
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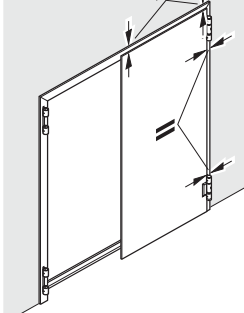
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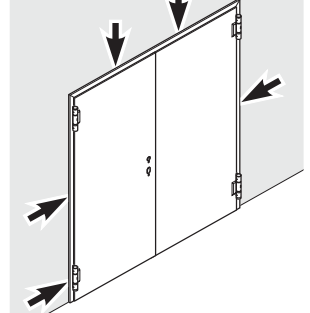
1

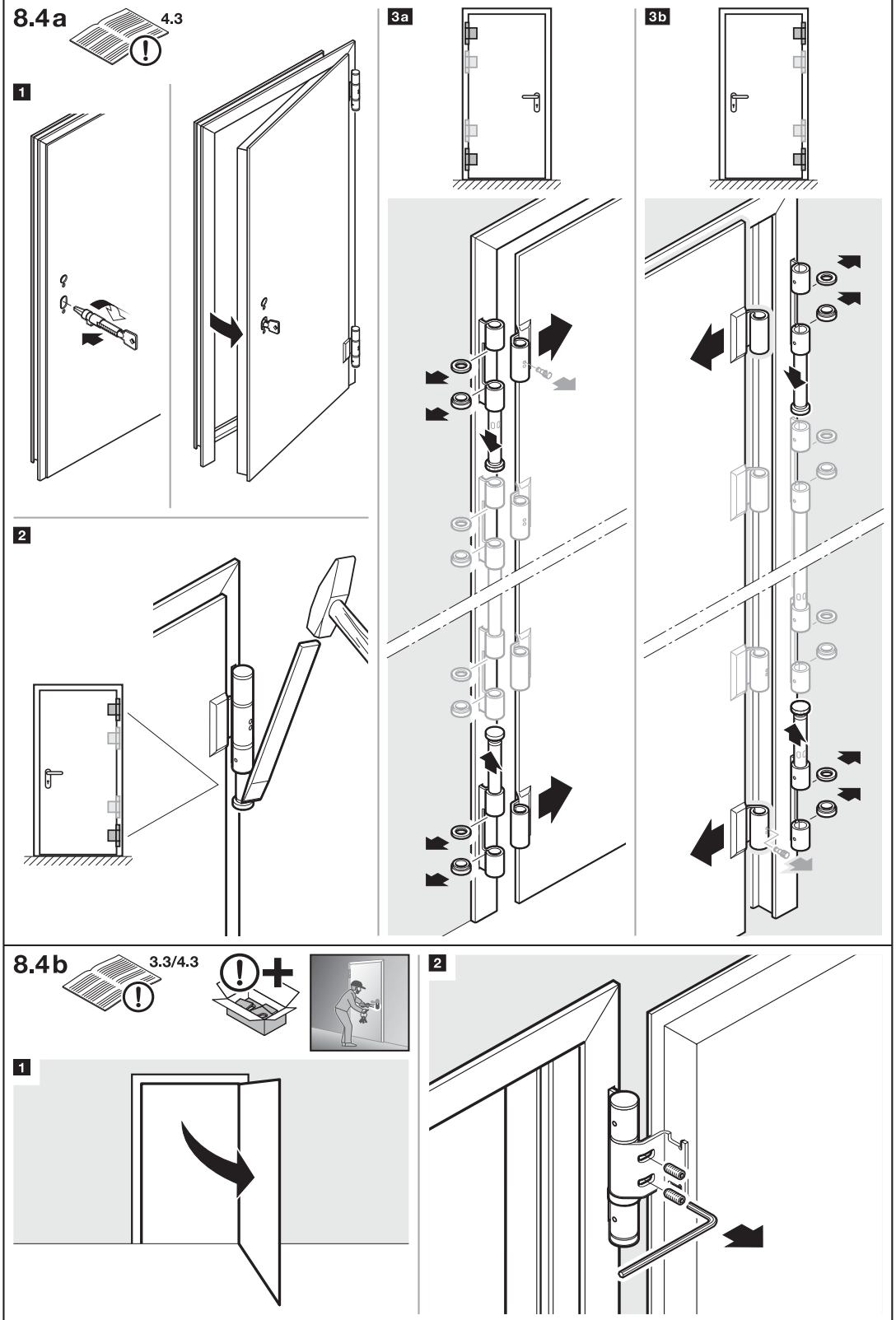


2



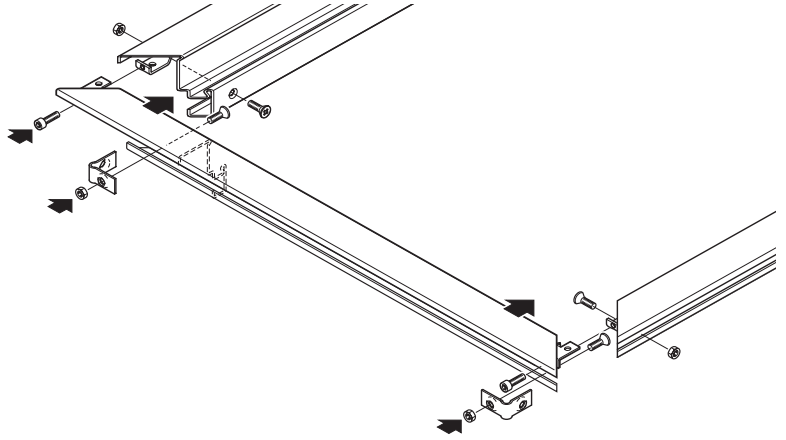
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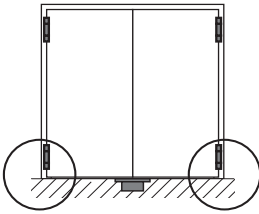
8.5

4.3

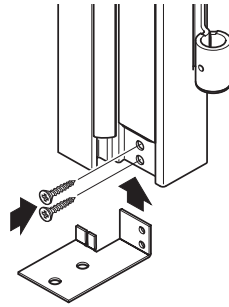


8.6

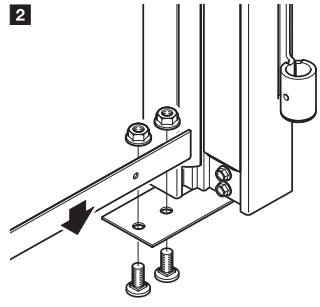
4.3



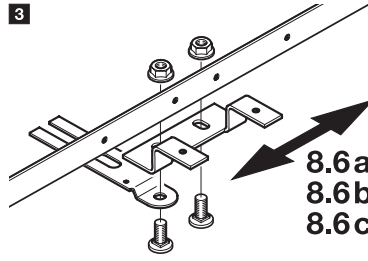
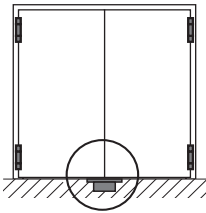
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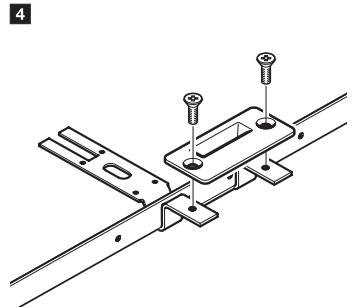
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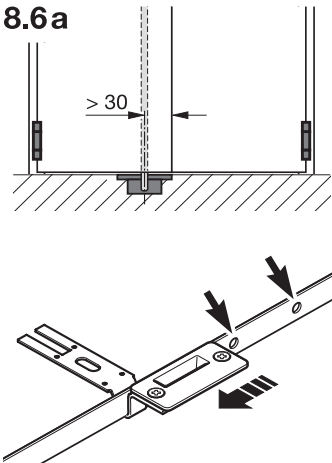
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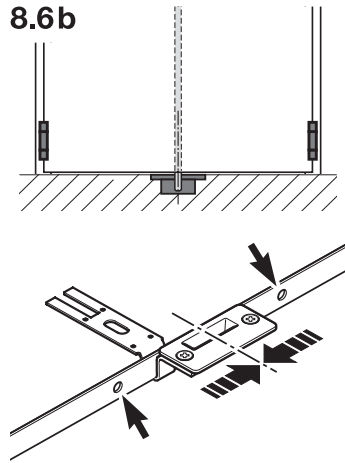
4



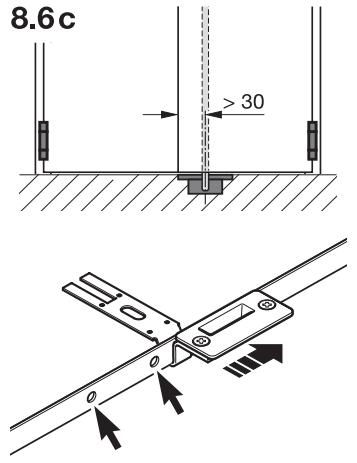
8.6a



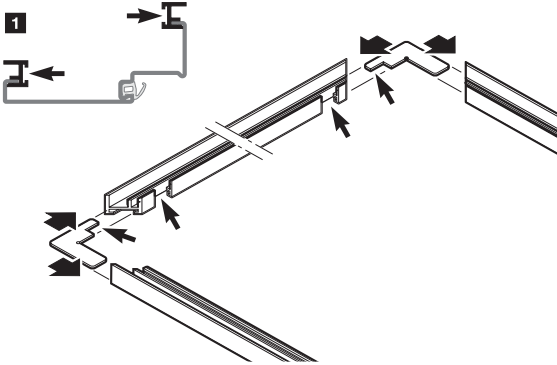
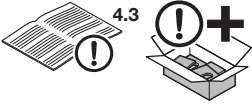
8.6b



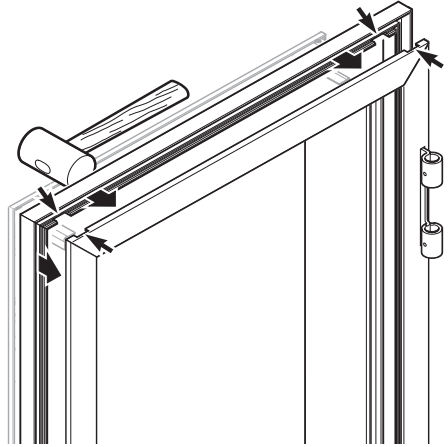
8.6c



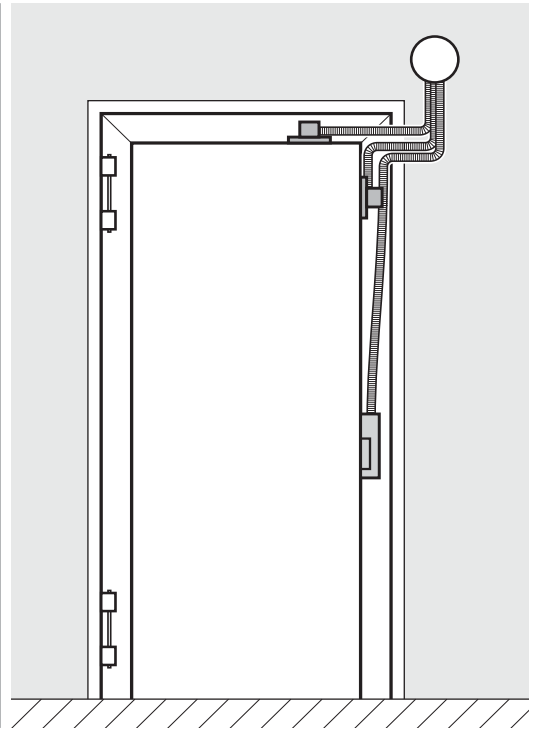
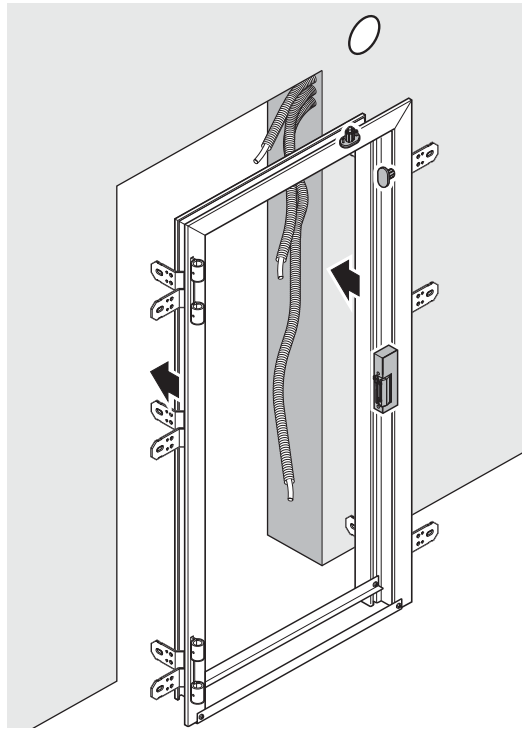
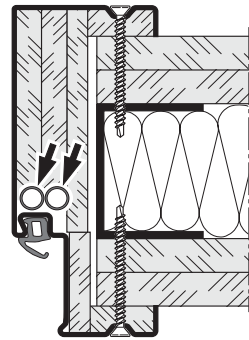
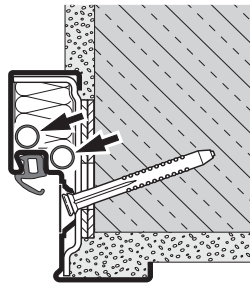
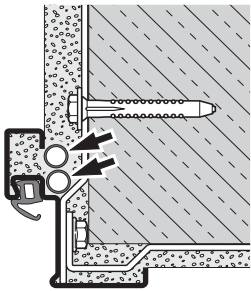
8.9



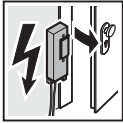
2



8.10



8.11



AC
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DC
≡



I.S.T. Systems

FT200/FT201

x

x

x

x

142 UF

x

x (T9) ~~x2~~

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143

x

x

x

x

x

x

x

14/34

x

x

x

x

Dorma

447/Basic

x

x

x

x

Lucky Basic

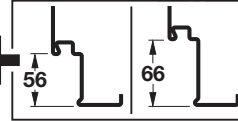
x

x

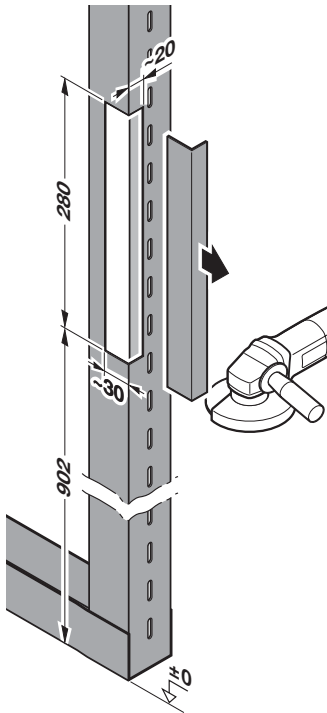
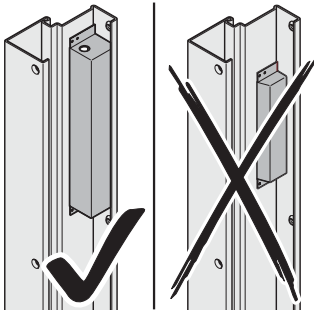
x

x

8.12

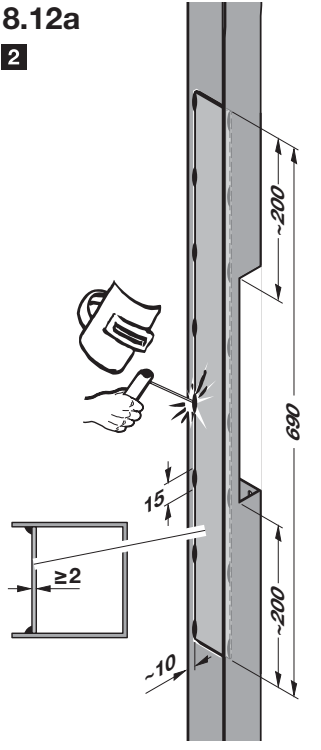


1



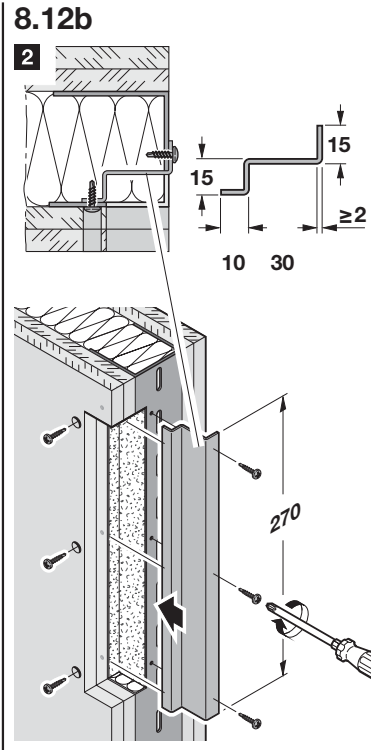
8.12a

2

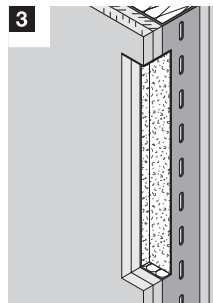


8.12b

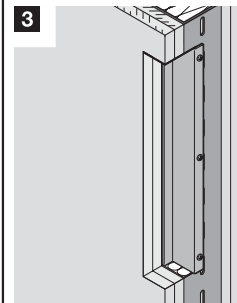
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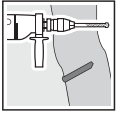
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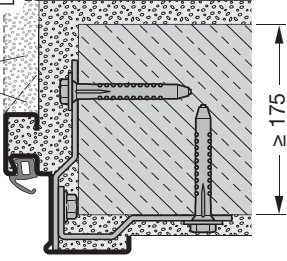
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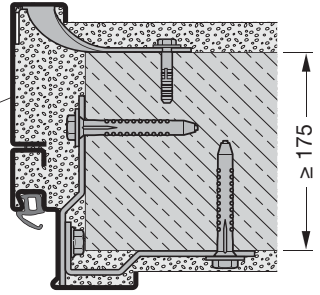
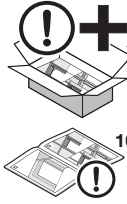
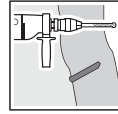
9/A1



HRUS 60



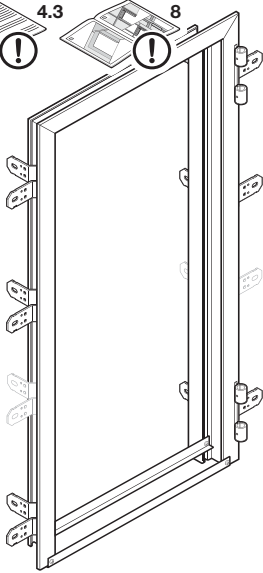
9/A3



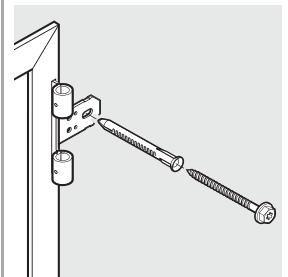
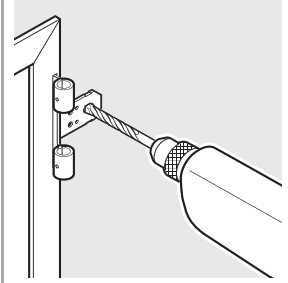
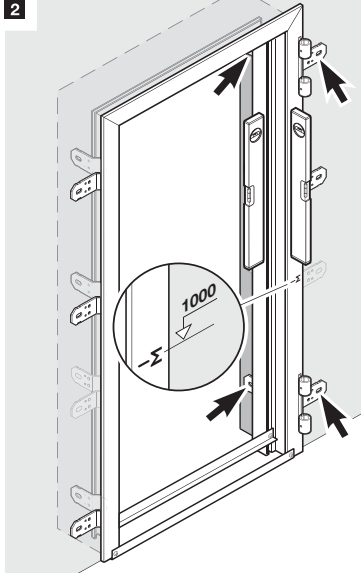
1

4.3

8

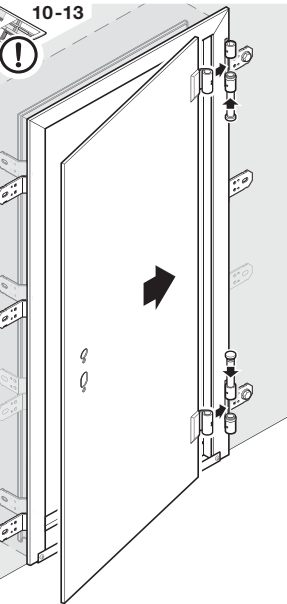


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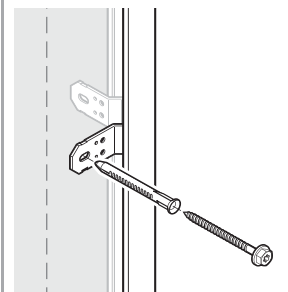
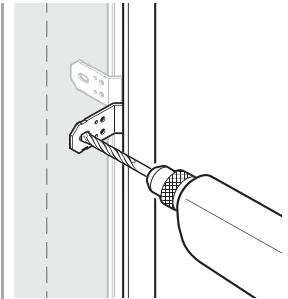
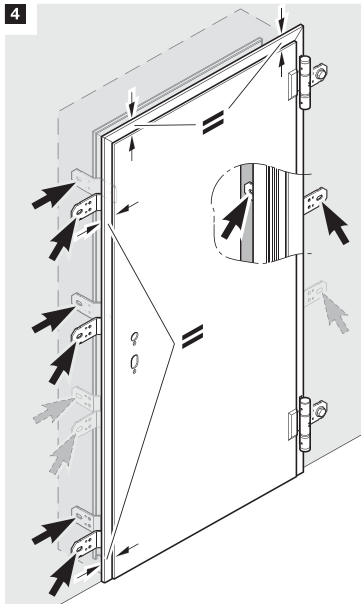


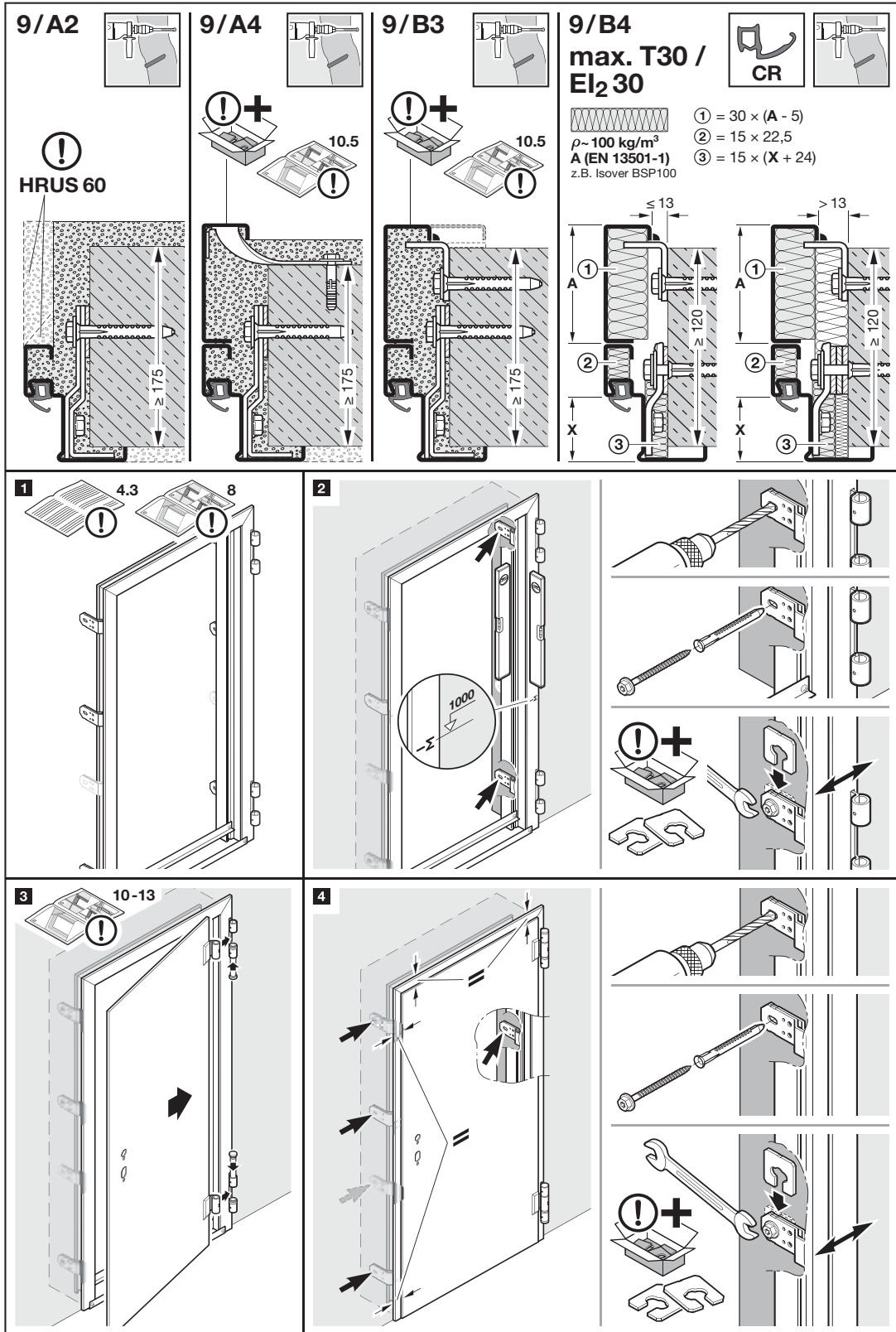
3

10-13

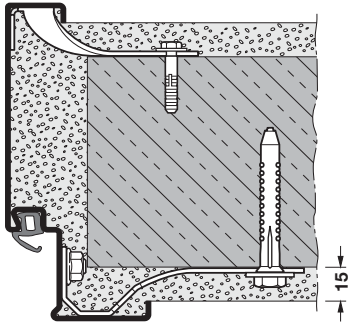
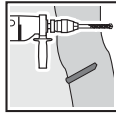


4

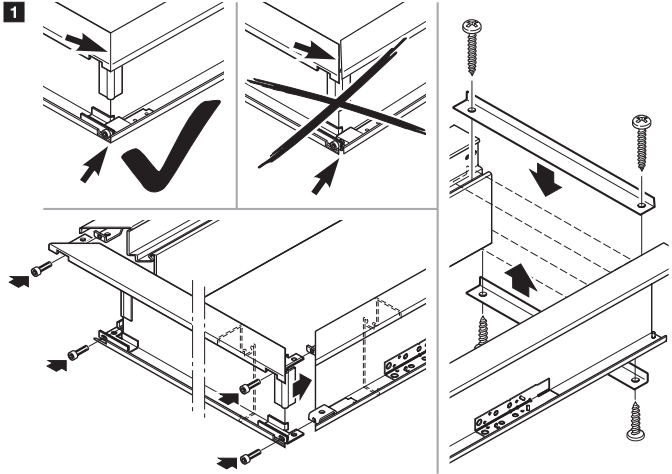




9/A5



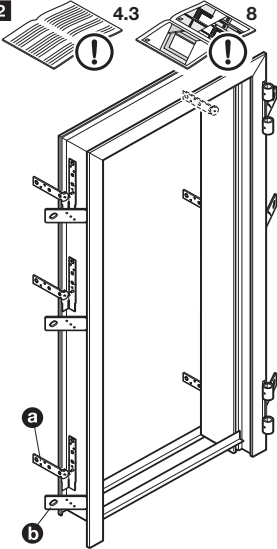
1



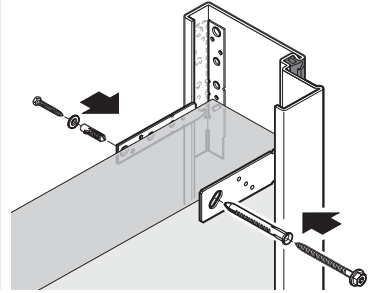
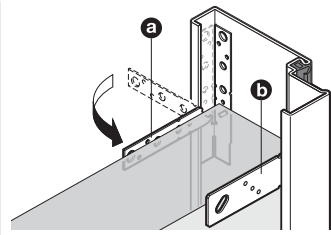
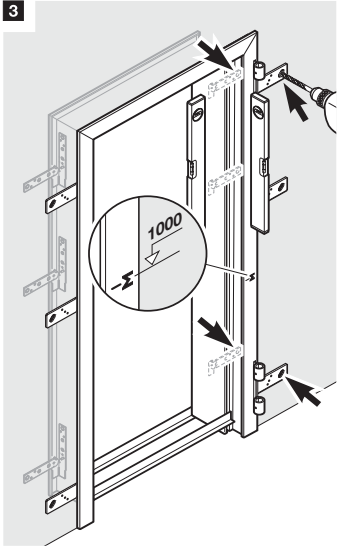
2

4.3

8

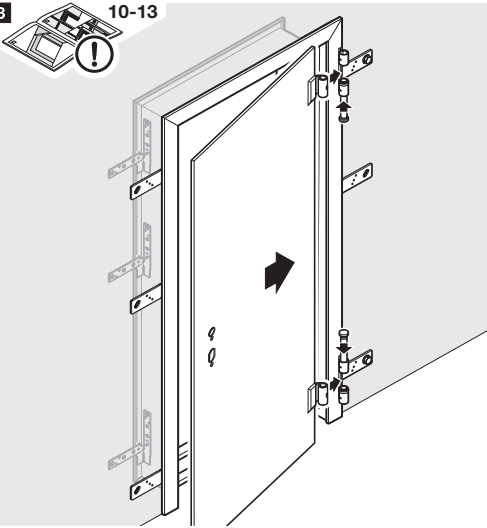


3

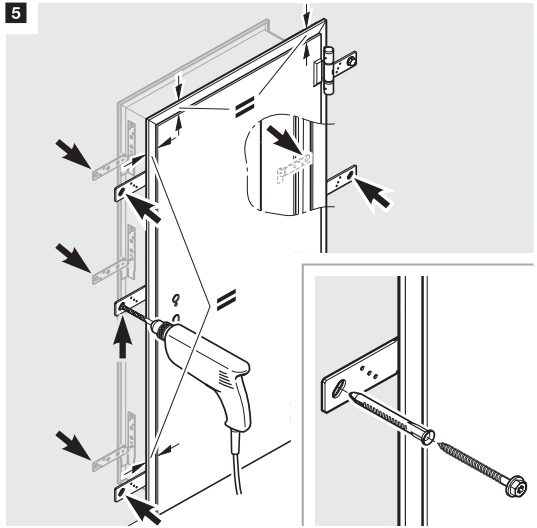


3

10-13

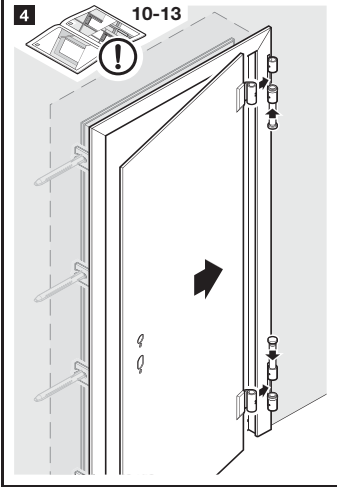
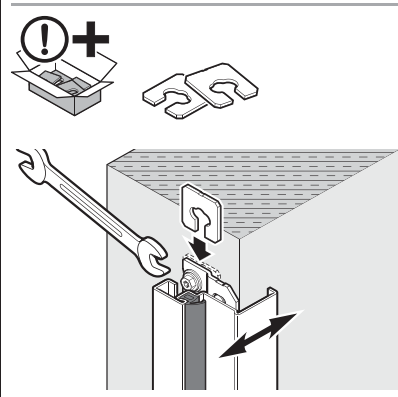
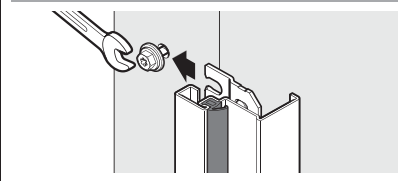
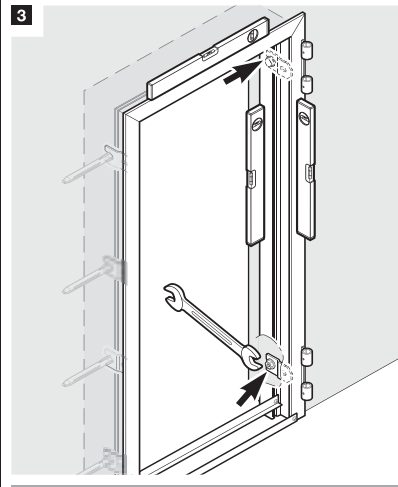
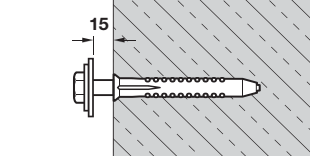
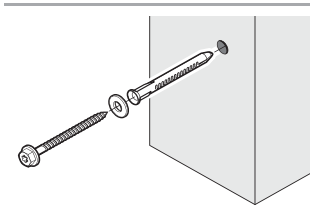
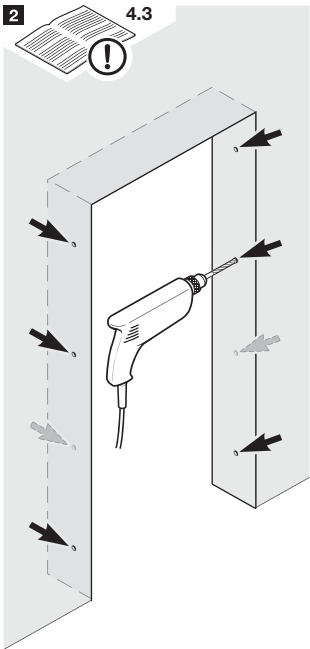
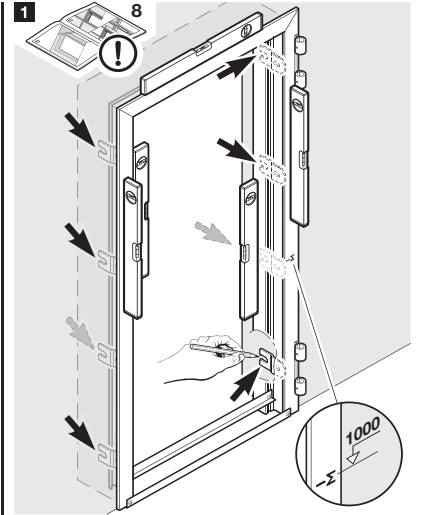
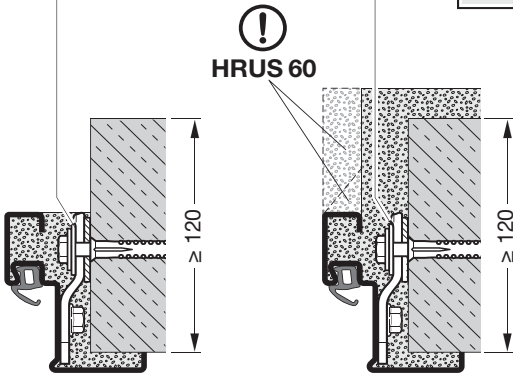


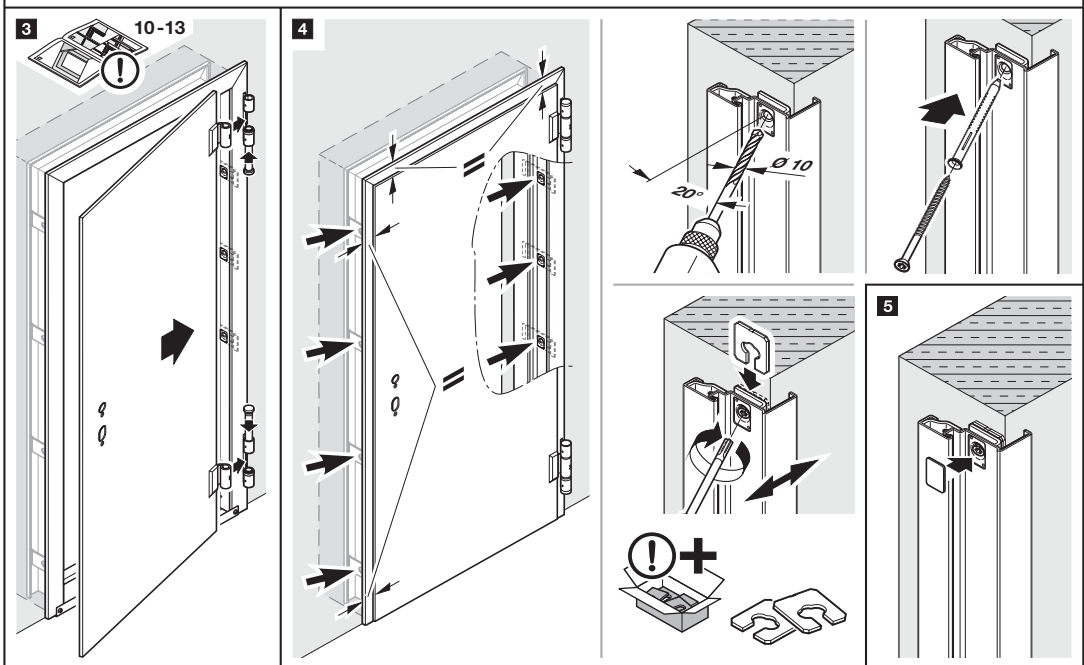
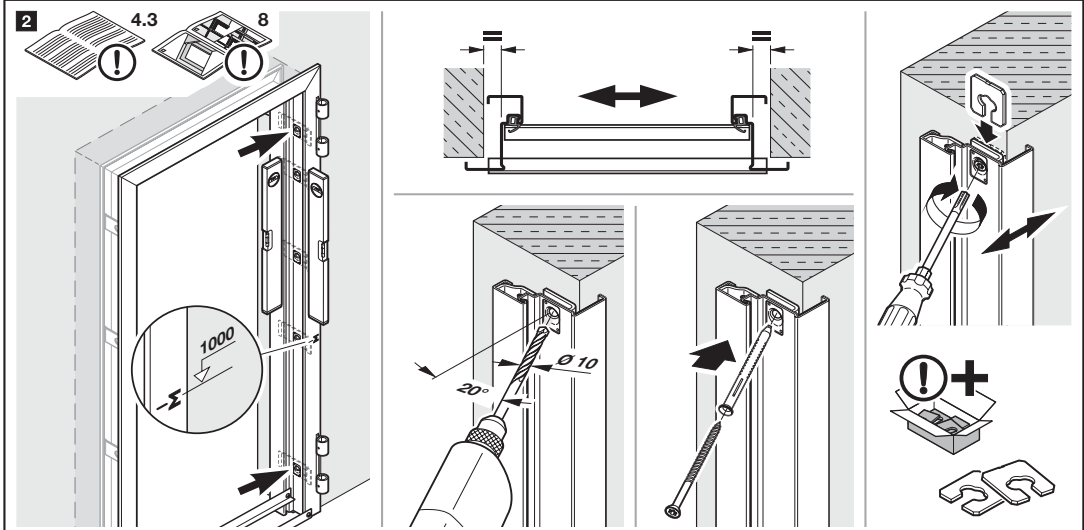
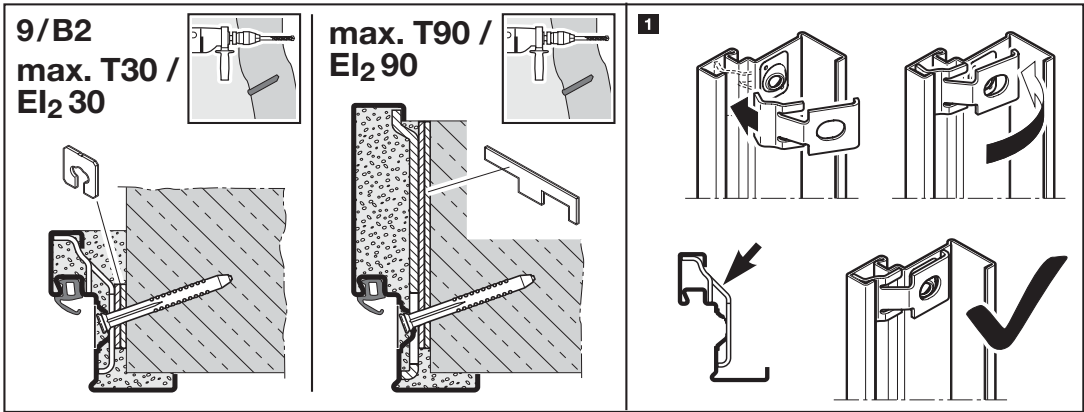
5



9/B1

DIN 9021-8.4-140 HV





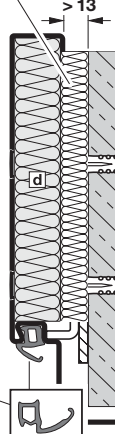
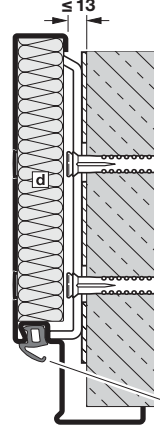
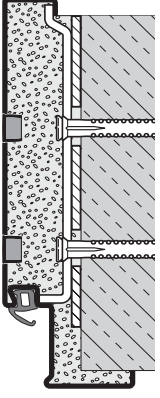
9/B5



9/B6
max. T30 /
EI2 30



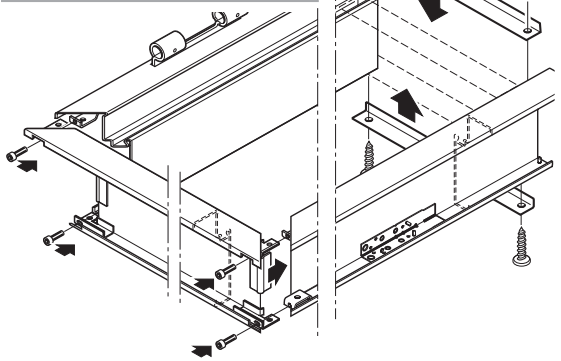
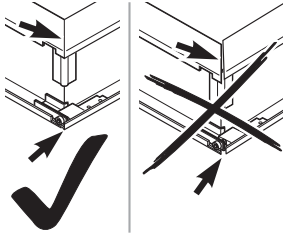
$\rho \sim 100 \text{ kg/m}^3$
A (EN 13501-1)



d Isover BSP100

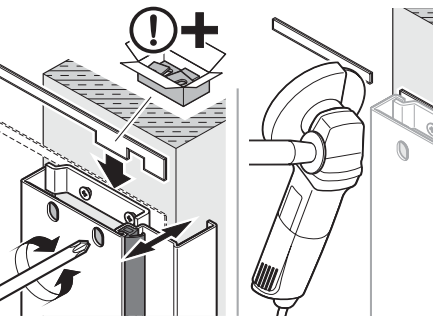
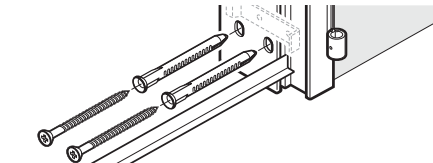
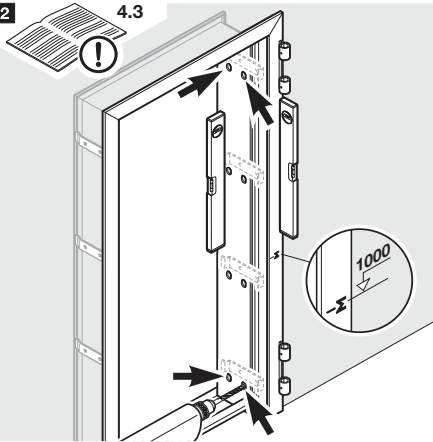


1



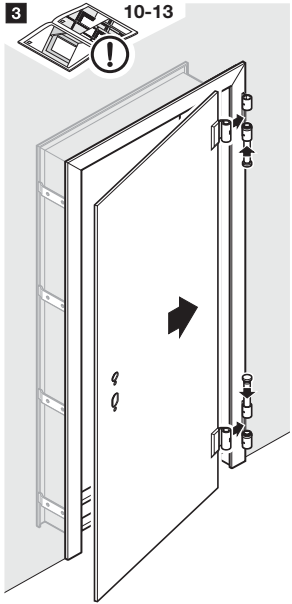
2

4.3

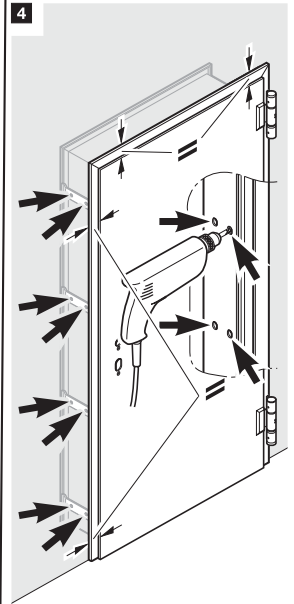


3

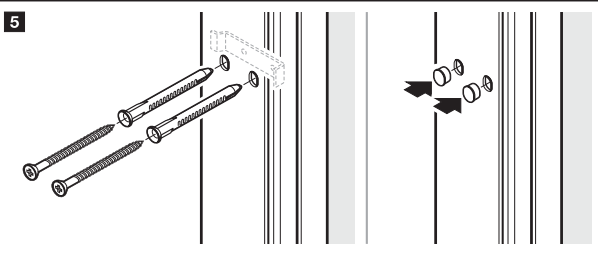
10-13

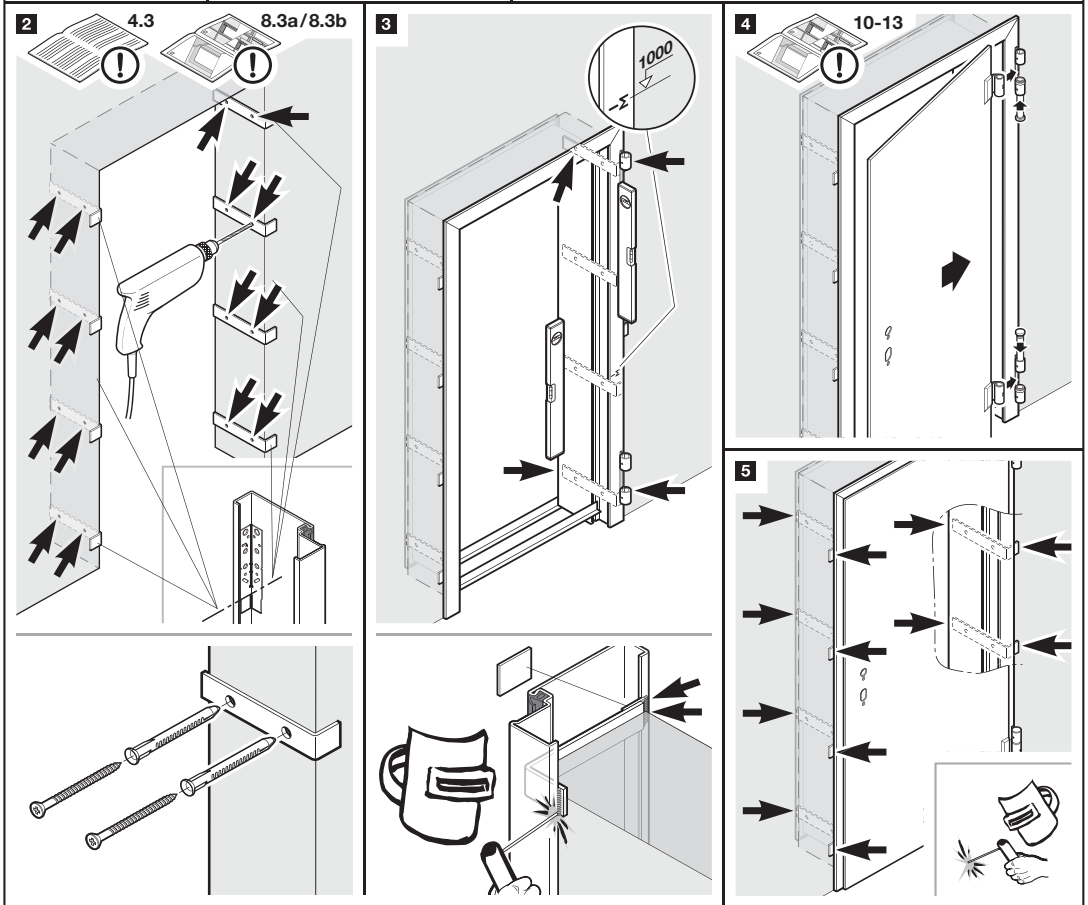
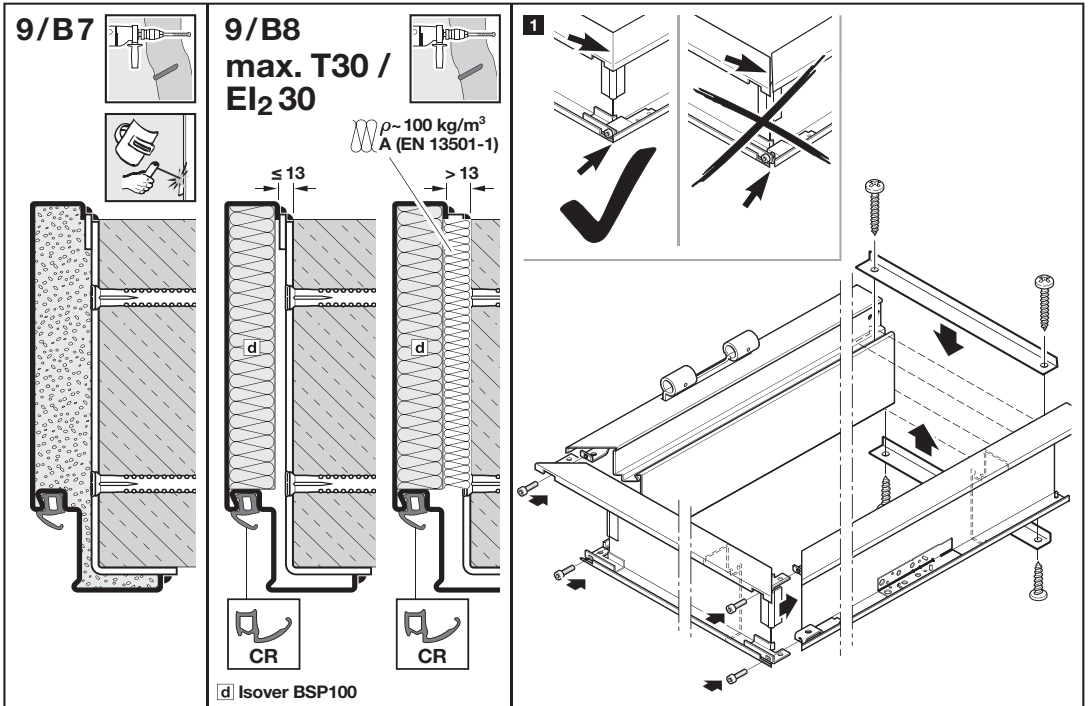


4



5





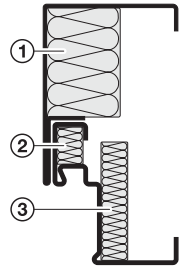
9/B9

max. T30/
EI₂30

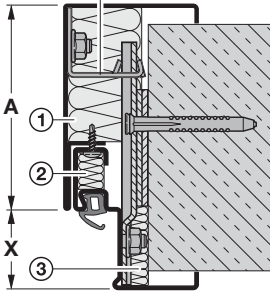


$\rho \sim 100 \text{ kg/m}^3$
A (EN 13501-1)
z.B. Isover BSP100

- ① = 40 × (A - 42)
- ② = 15 × 22,5
- ③ = 15 × (X + 24)



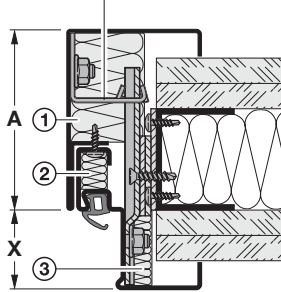
A > 94



➔ 2a 2b



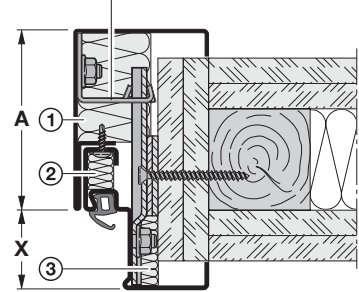
A > 94



➔ 2c



A > 94



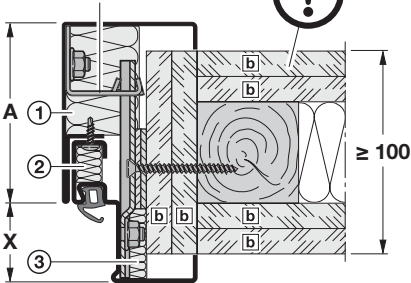
➔ 2d

max. T30/
EI₂30



+ 24)

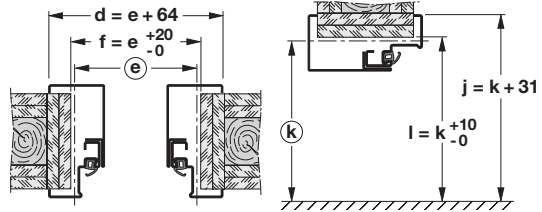
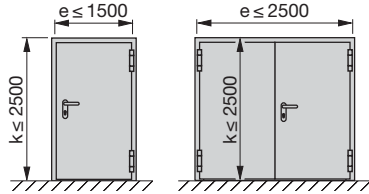
A > 94



F90B DIN 4102-4 Tab. 49

b A-12,5-EN 520

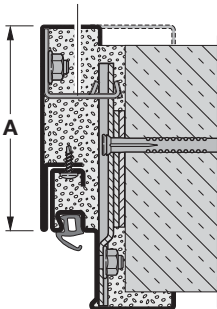
➔ 2e



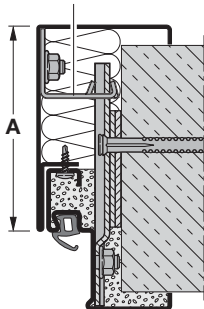
max. T90/
EI₂90



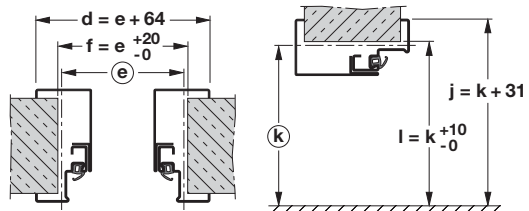
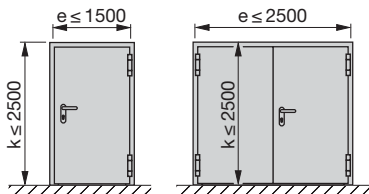
A > 94

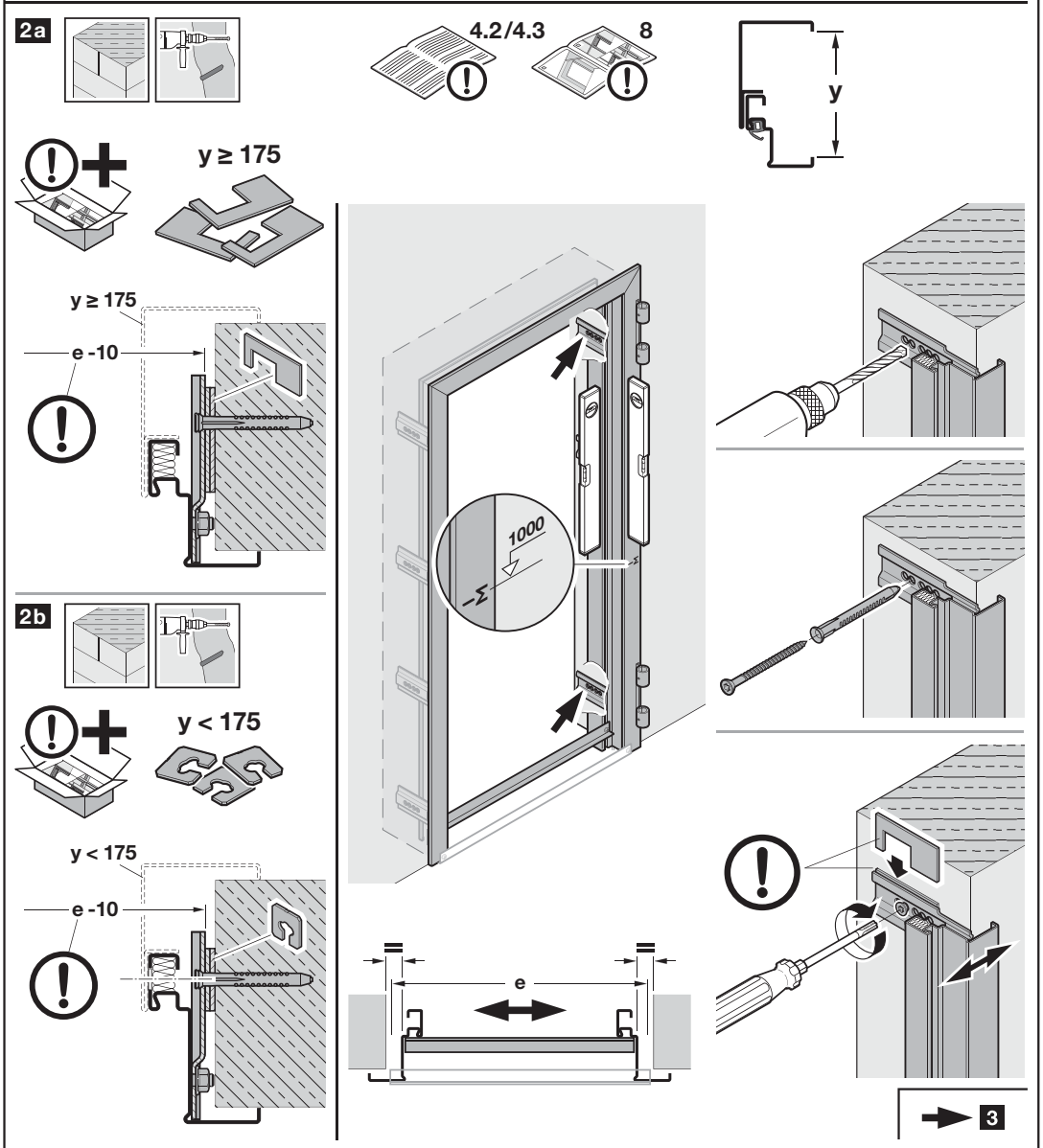
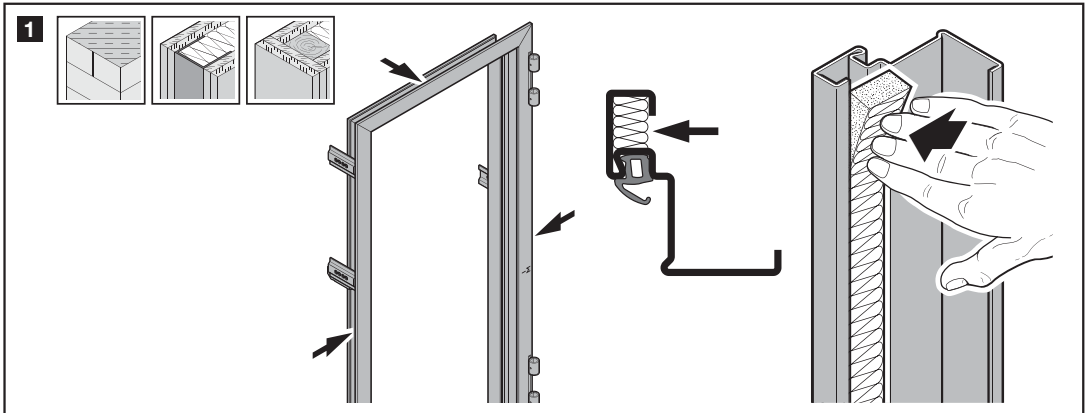


A > 94

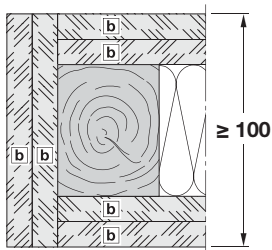
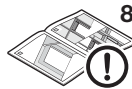


➔ 2a 2b

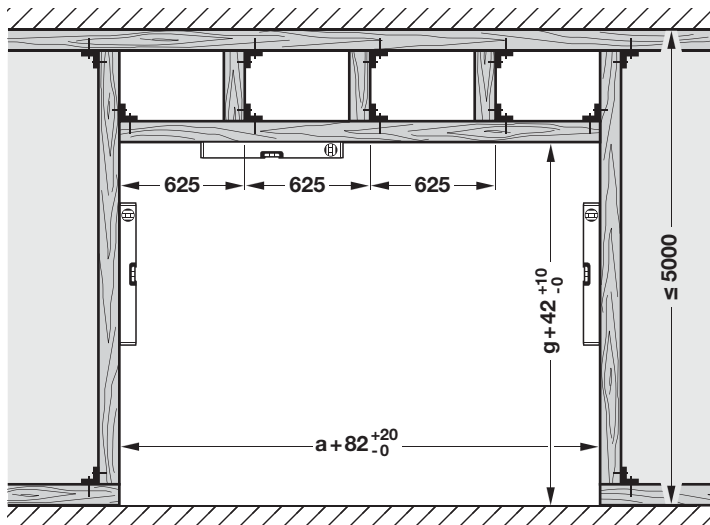




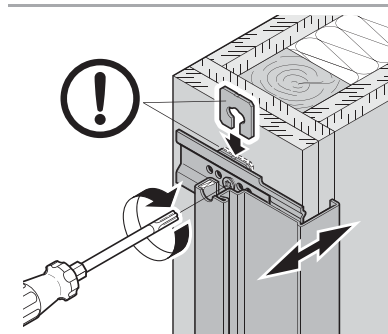
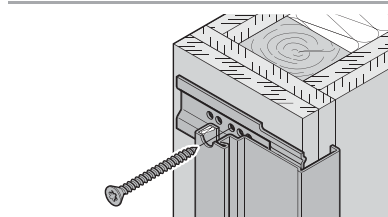
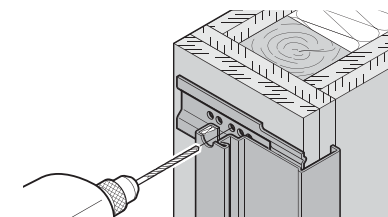
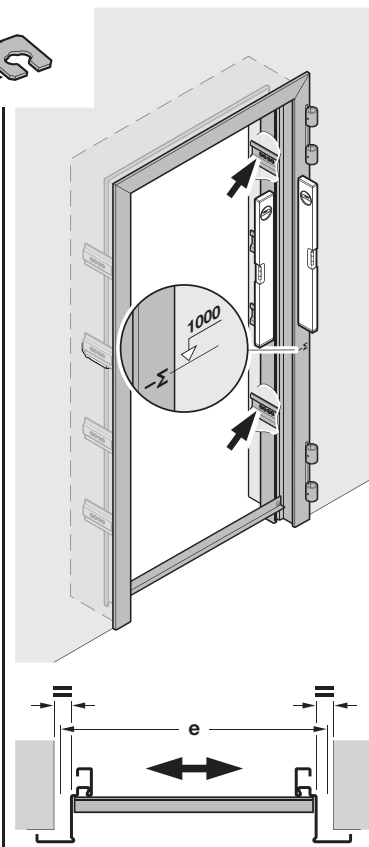
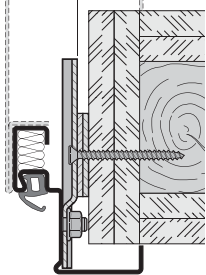
2e



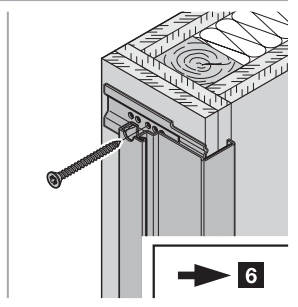
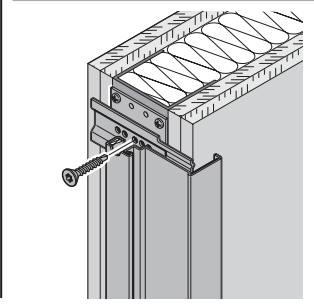
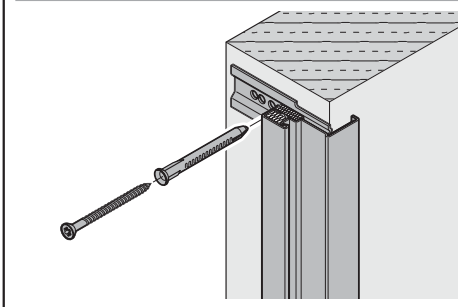
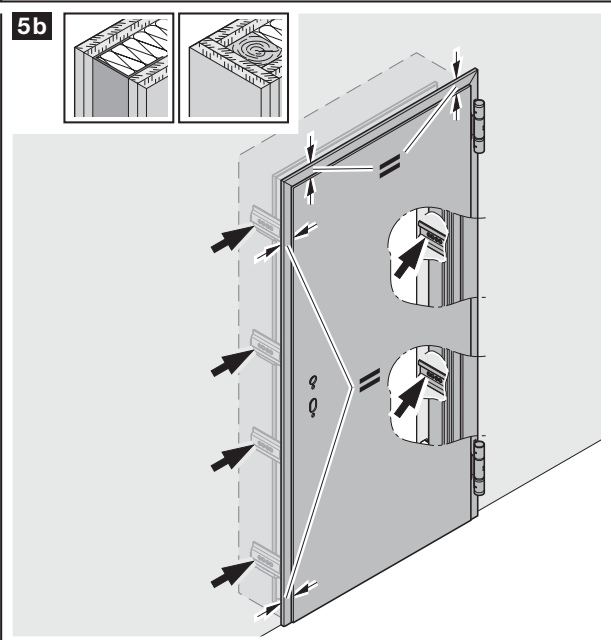
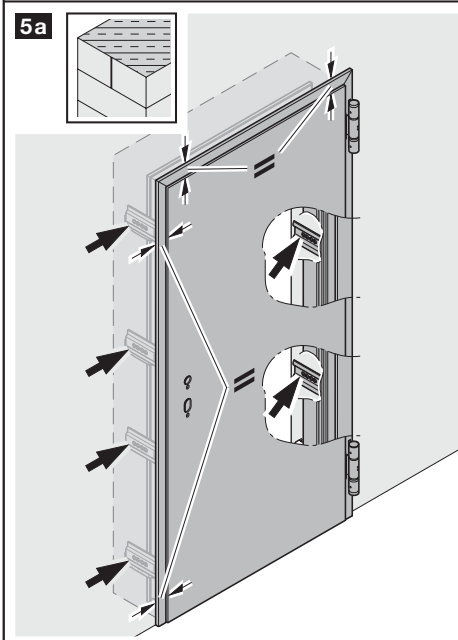
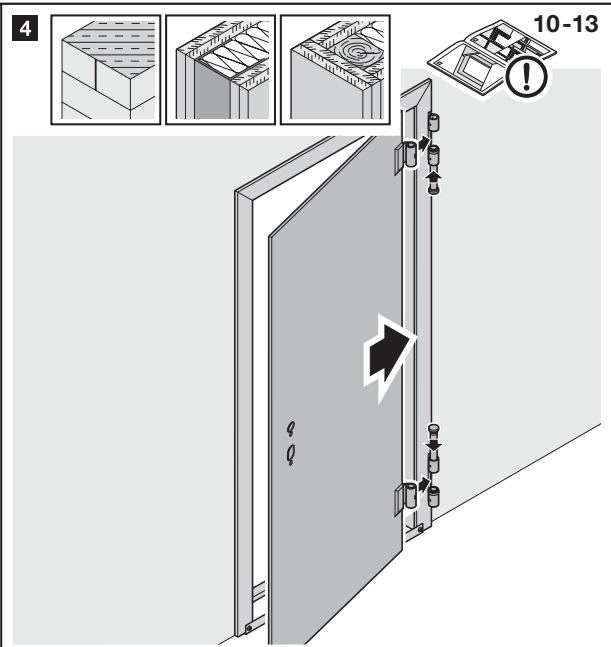
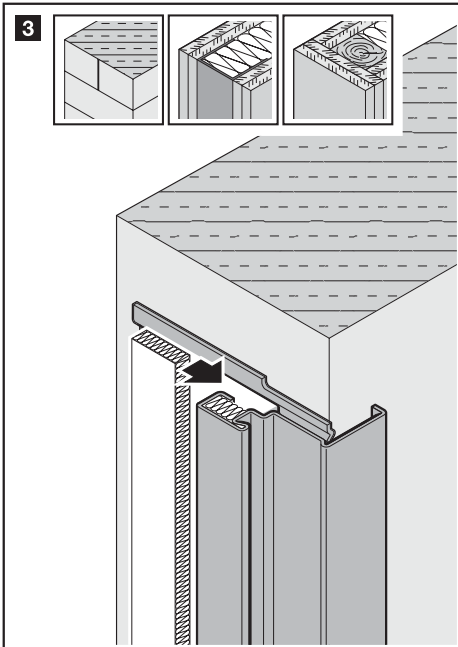
b A-12,5-EN 520

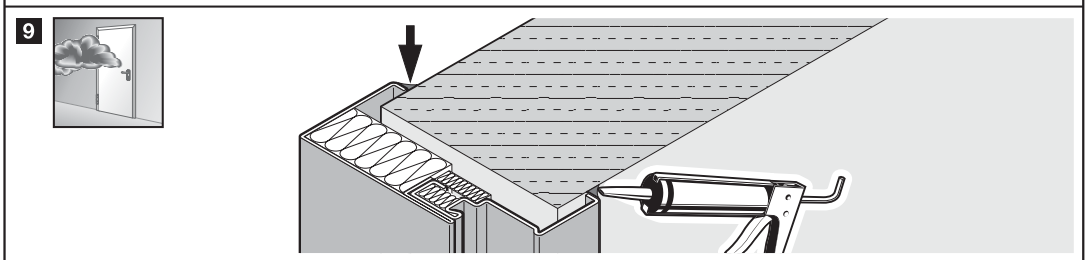
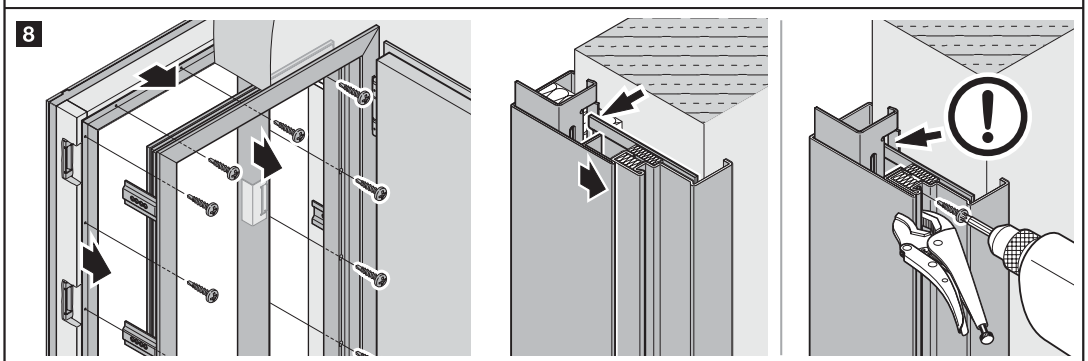
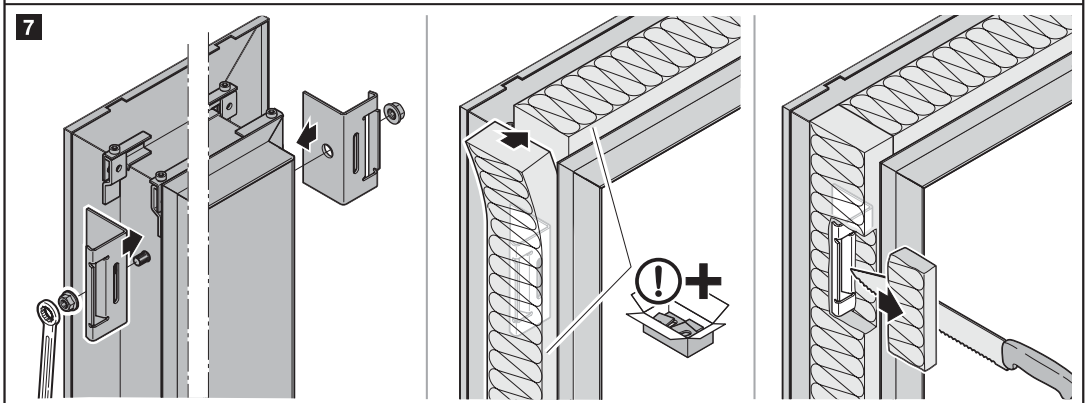
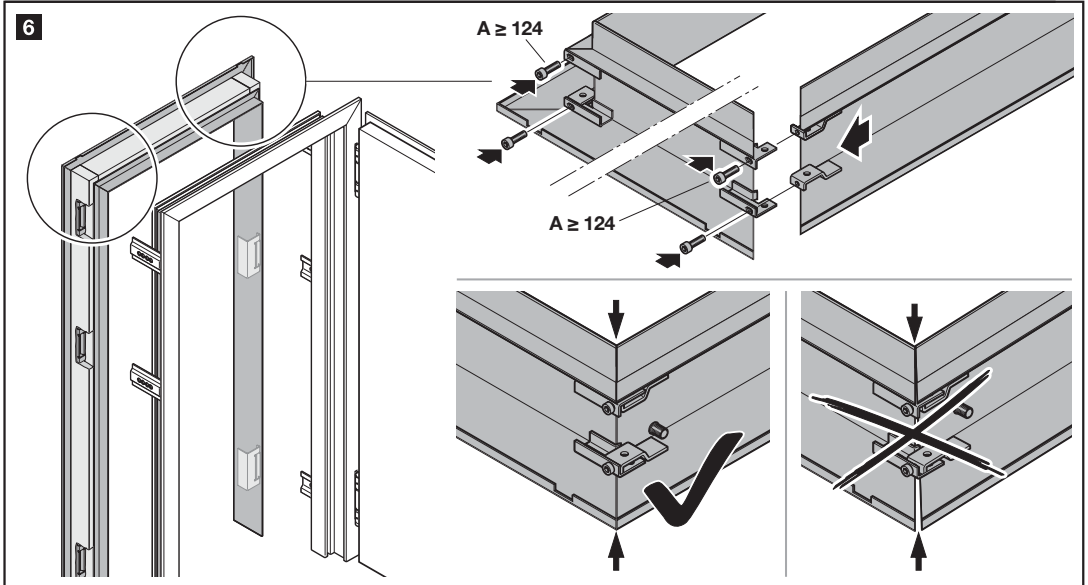


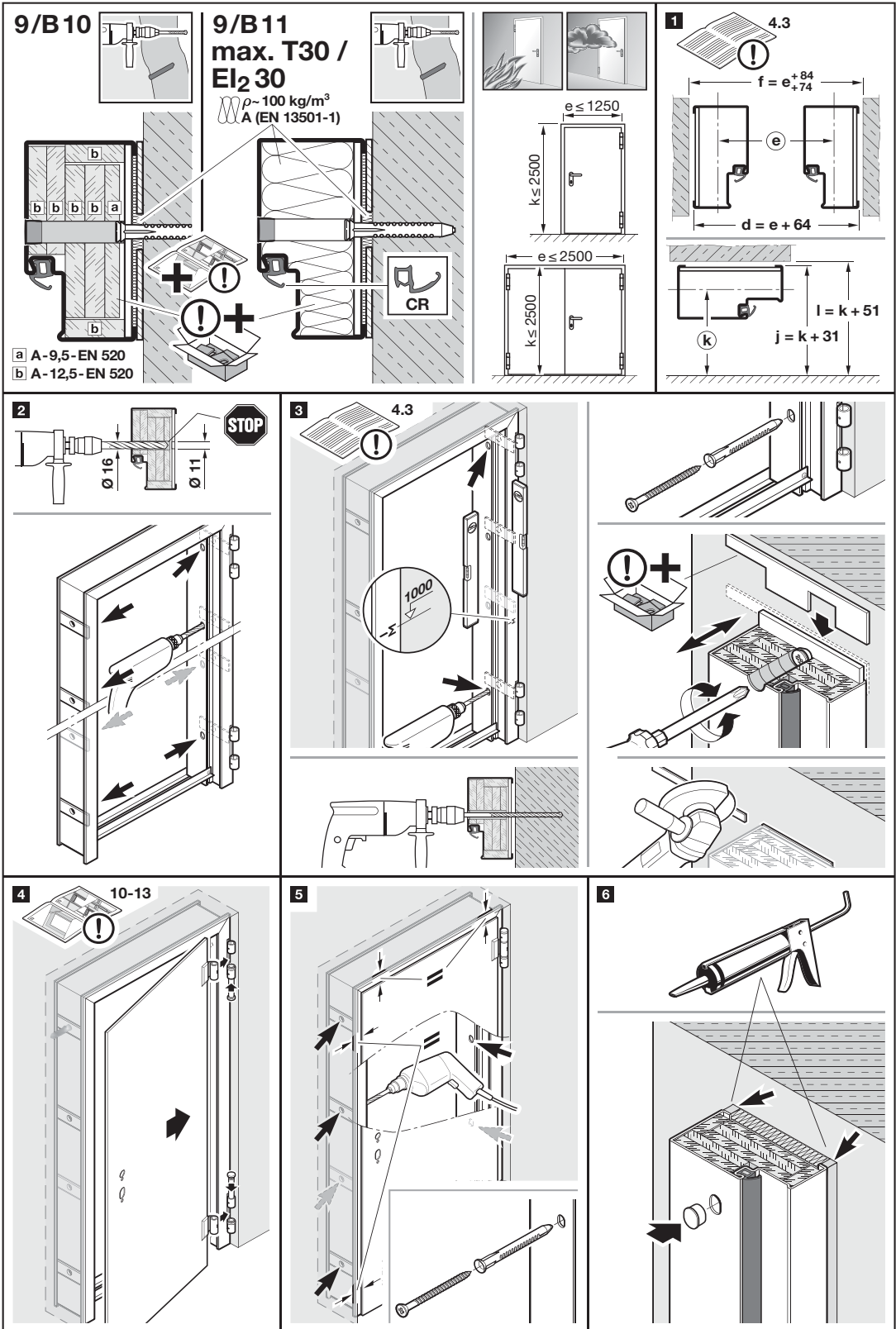
e-10



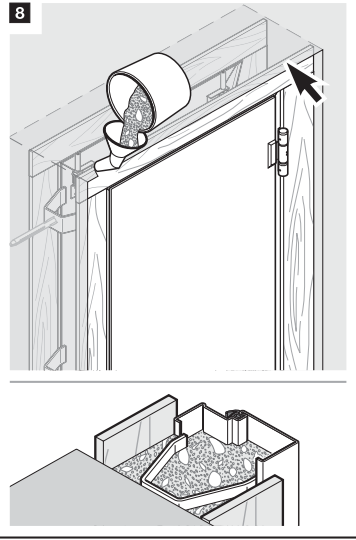
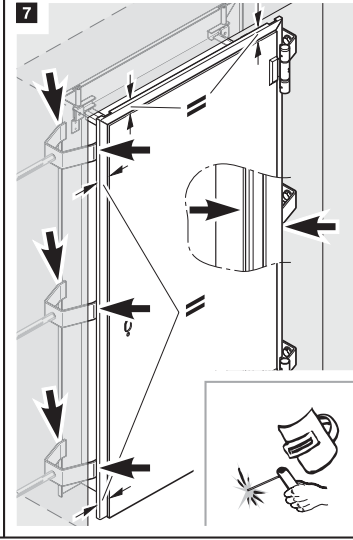
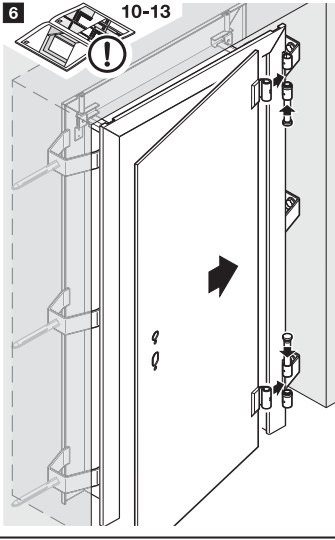
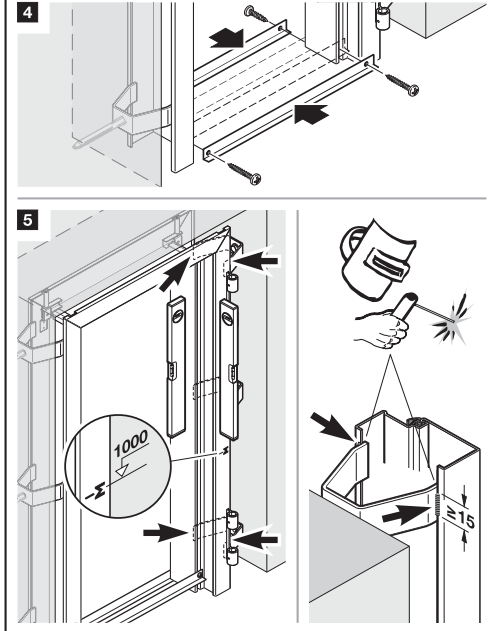
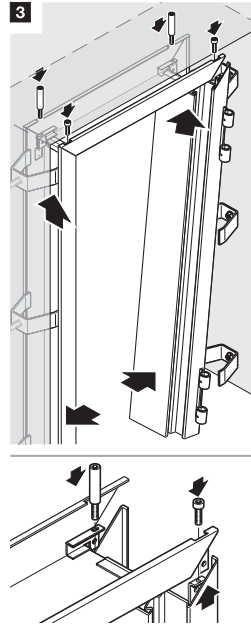
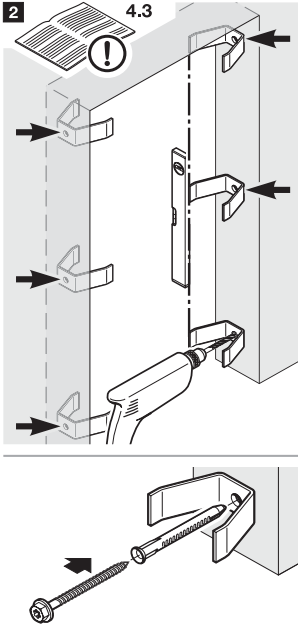
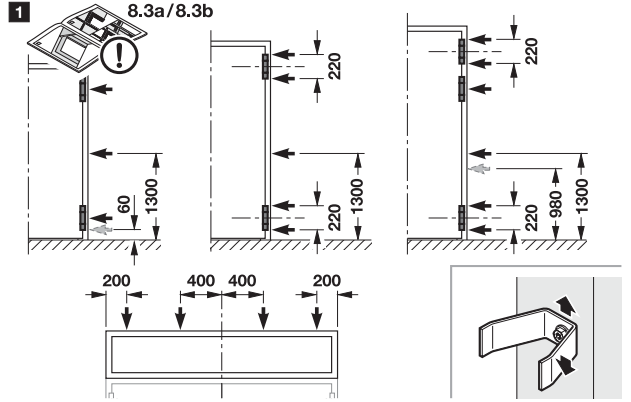
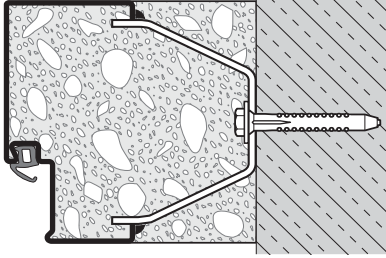
➔ 3



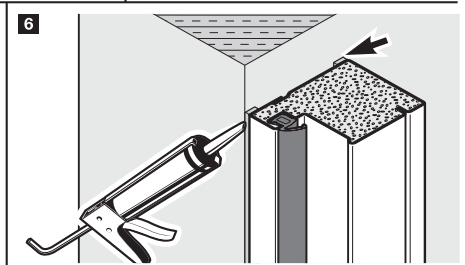
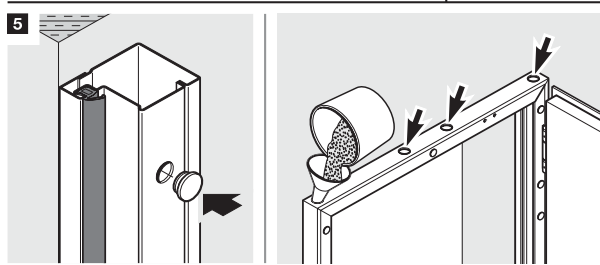
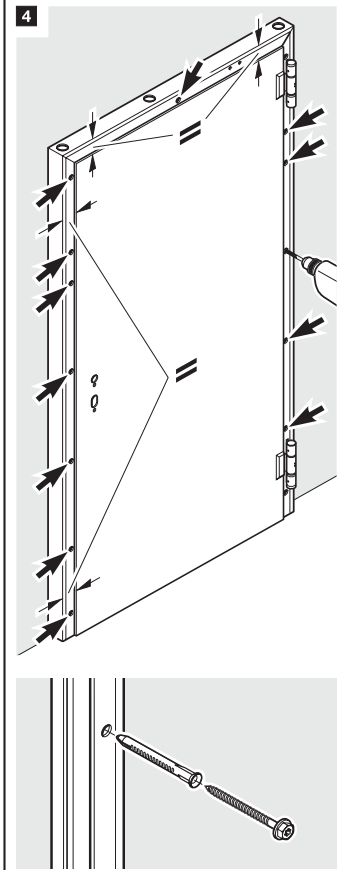
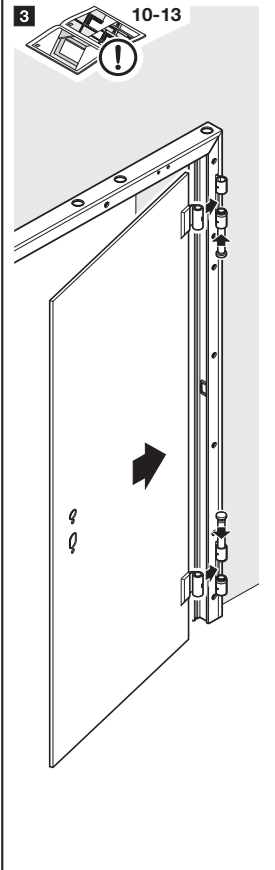
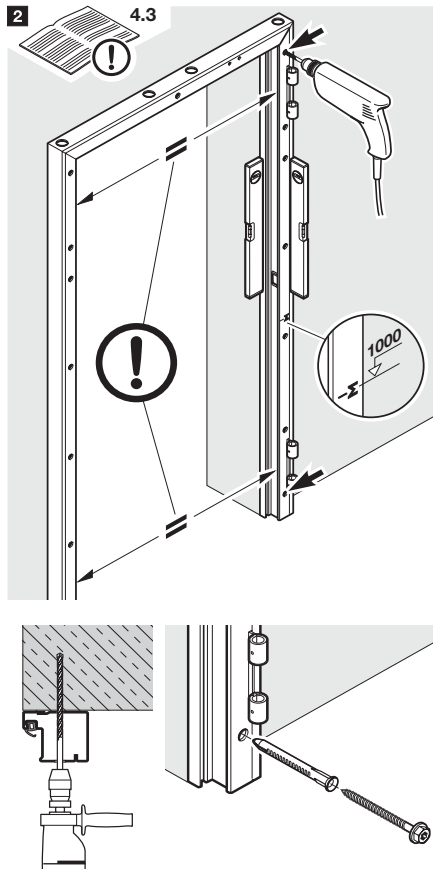
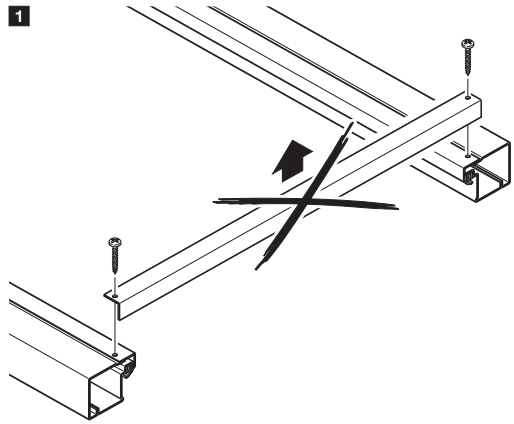
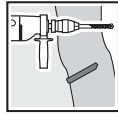
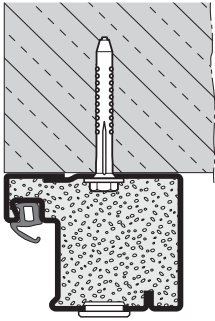


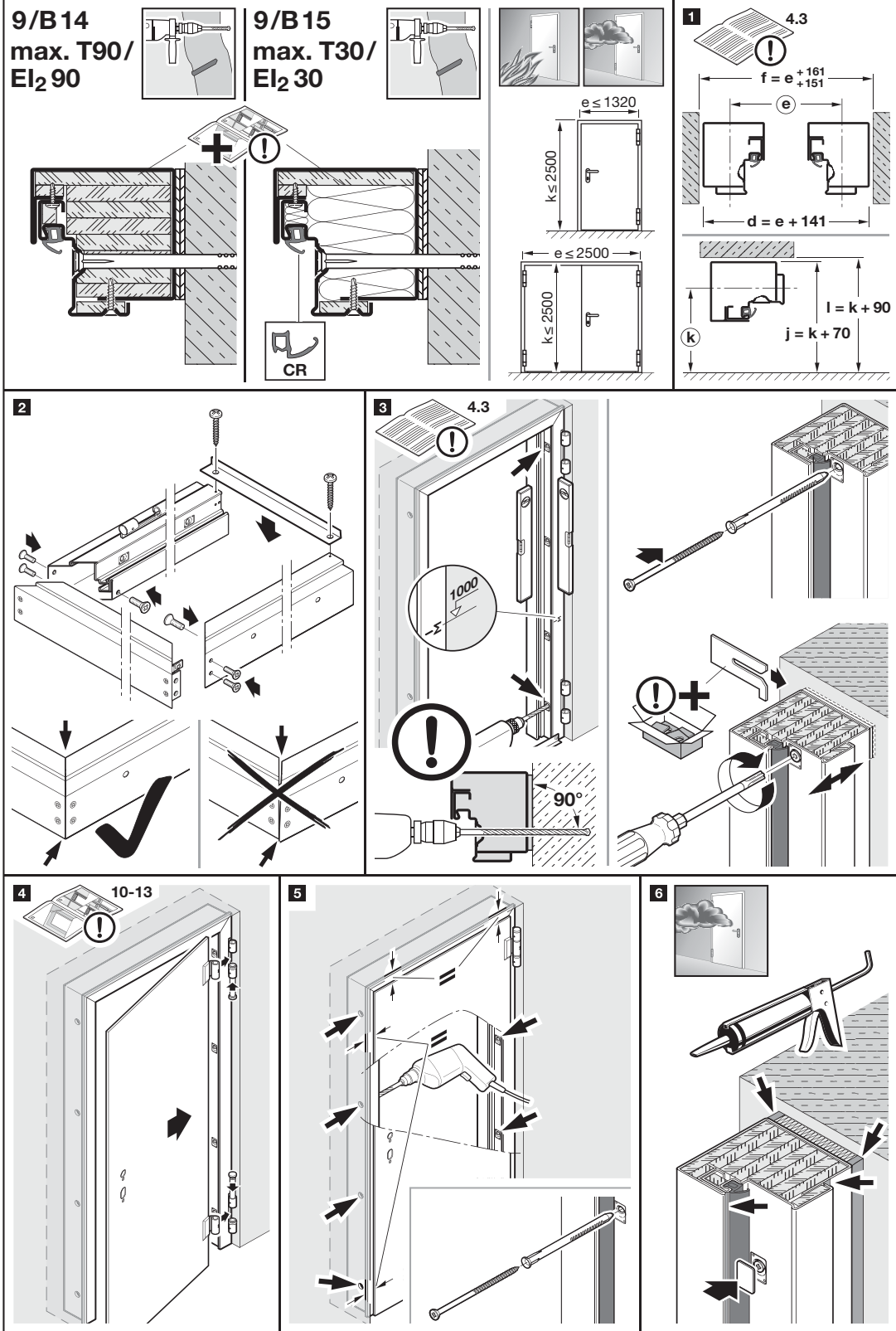


9/B12



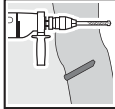
9/B13
max. T30 / EI₂30



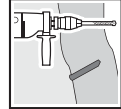


9/C1

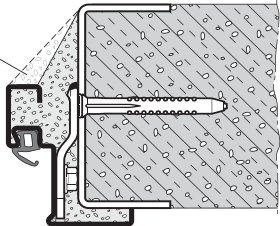
~~T90-2 / EI₂90-2~~



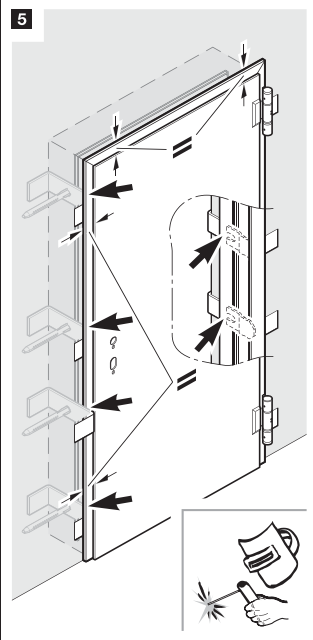
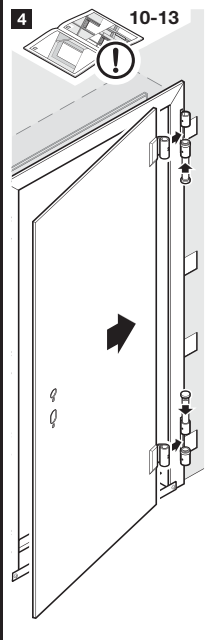
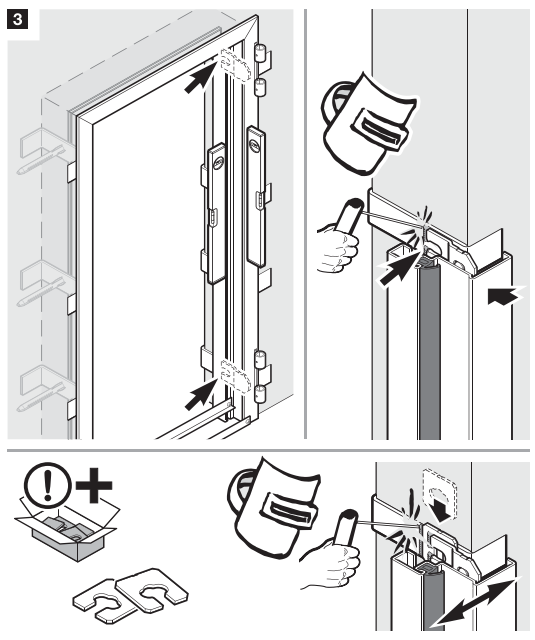
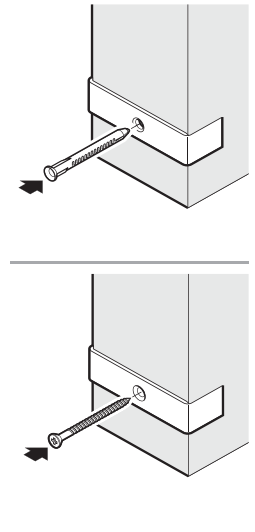
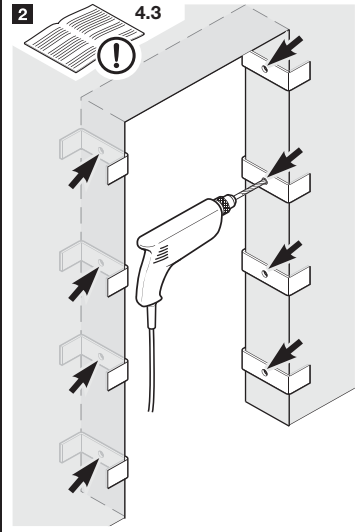
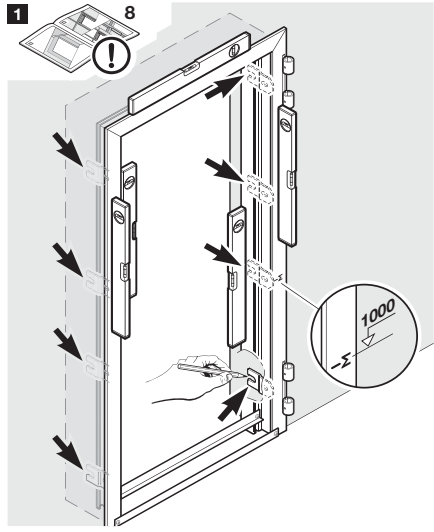
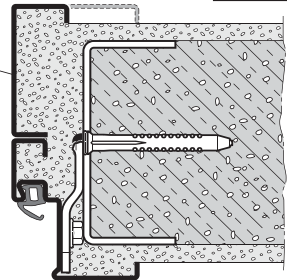
9/C2



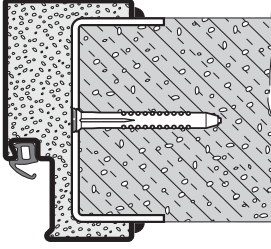
! HRUS 60



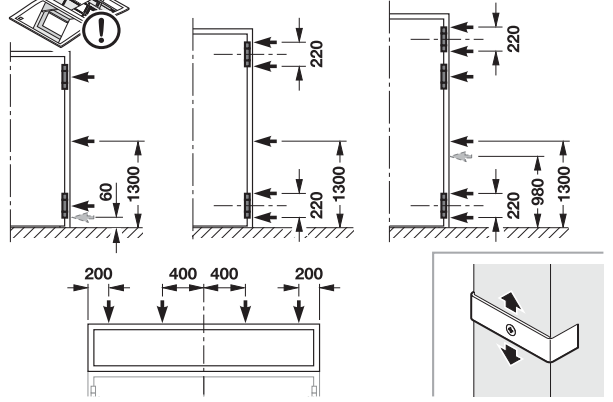
! +



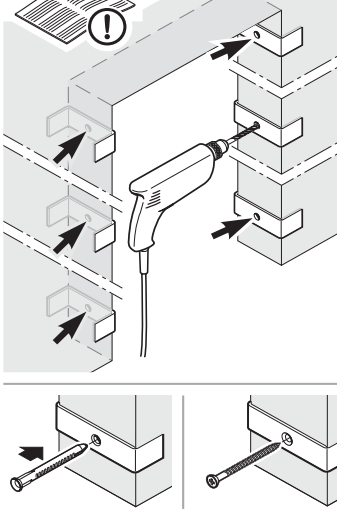
9/C3



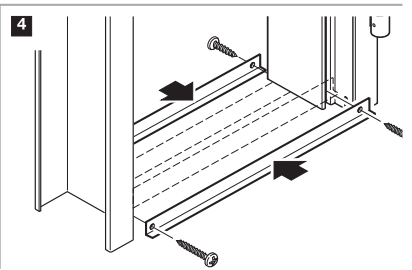
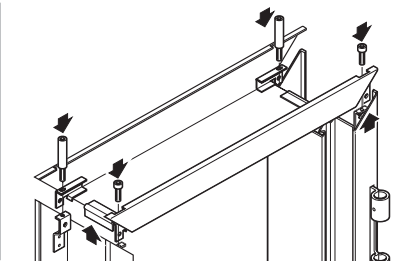
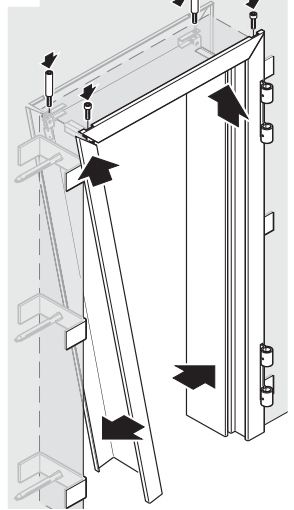
1 8.3a/8.3b



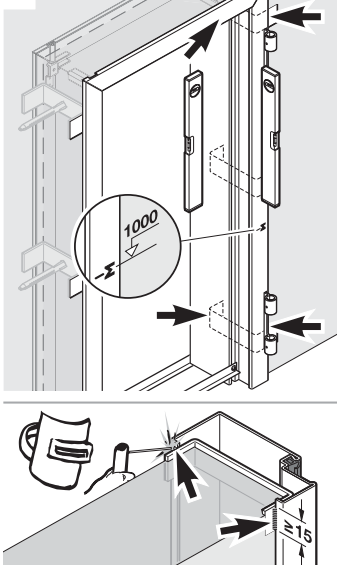
2 4.3



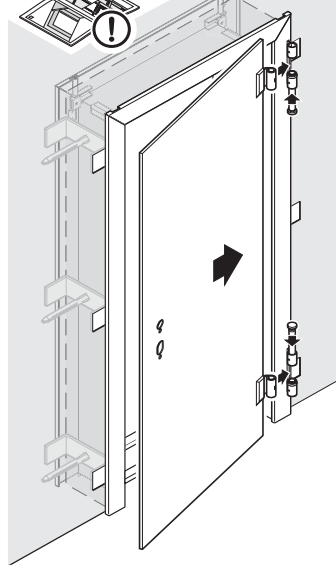
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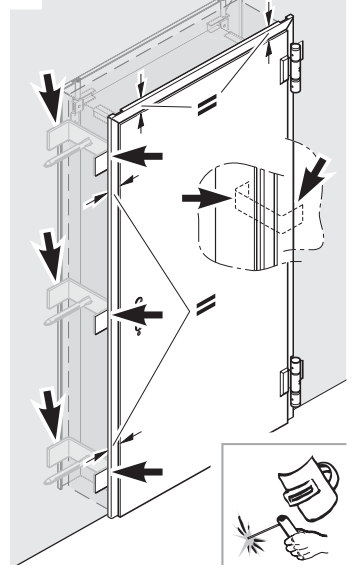
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6 10-13

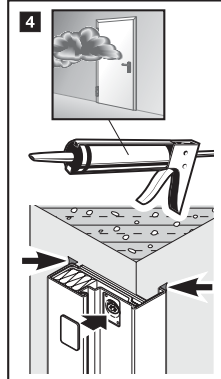
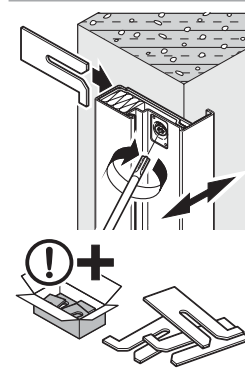
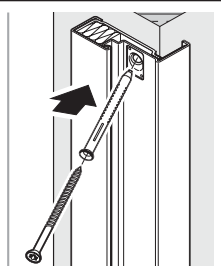
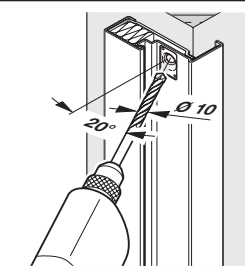
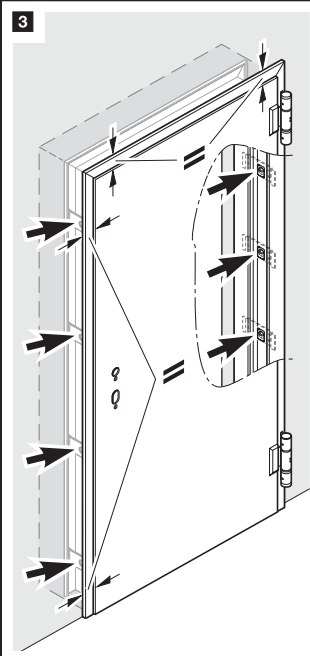
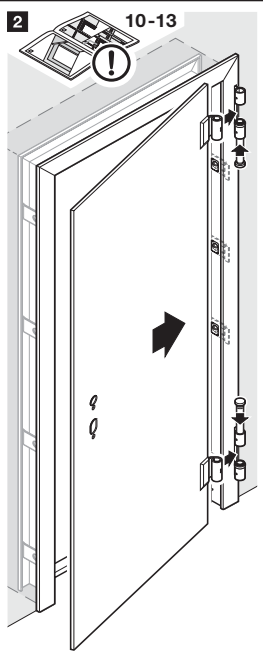
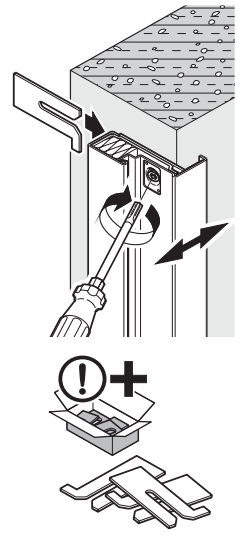
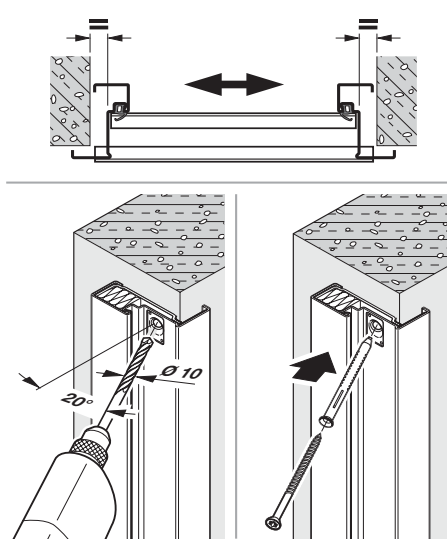
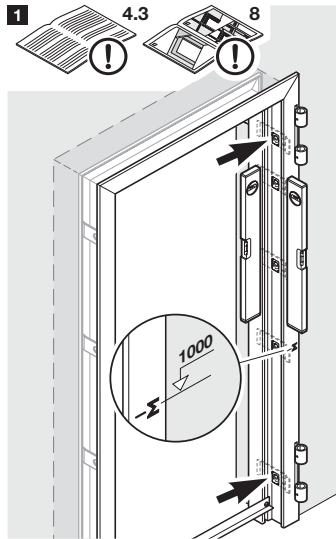
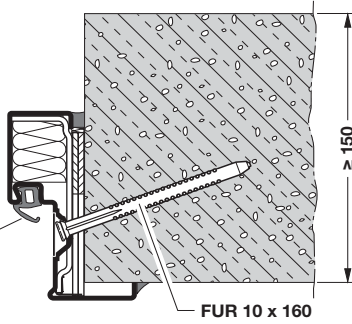


7



9/C4
max. T30 /
EI₂ 30

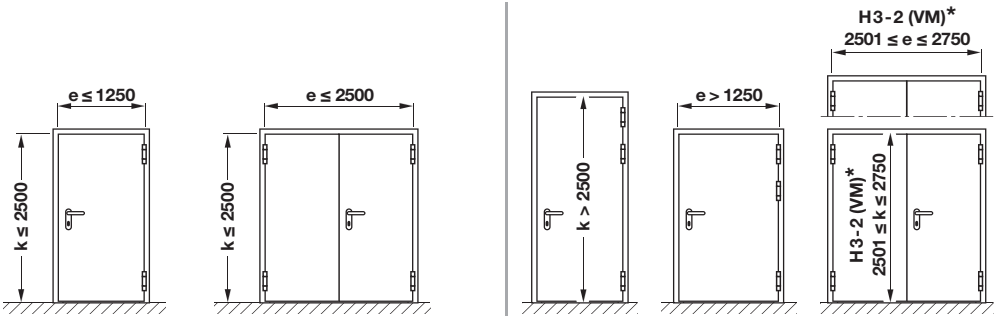
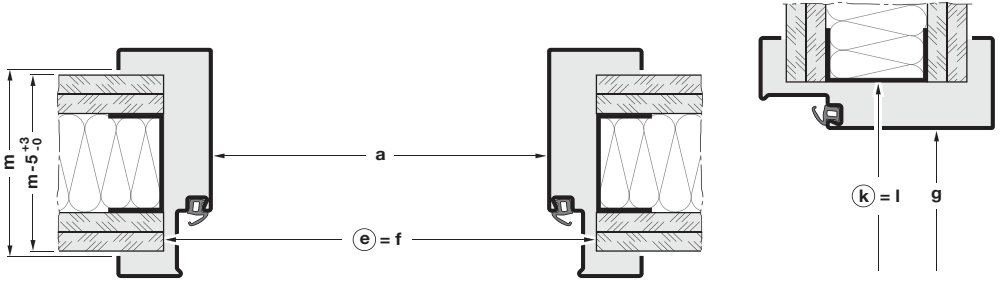
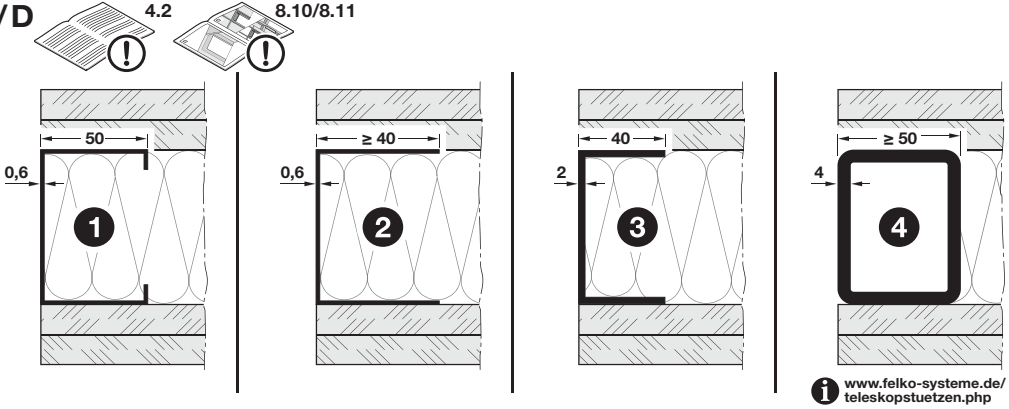
~~H30~~
~~H30B~~



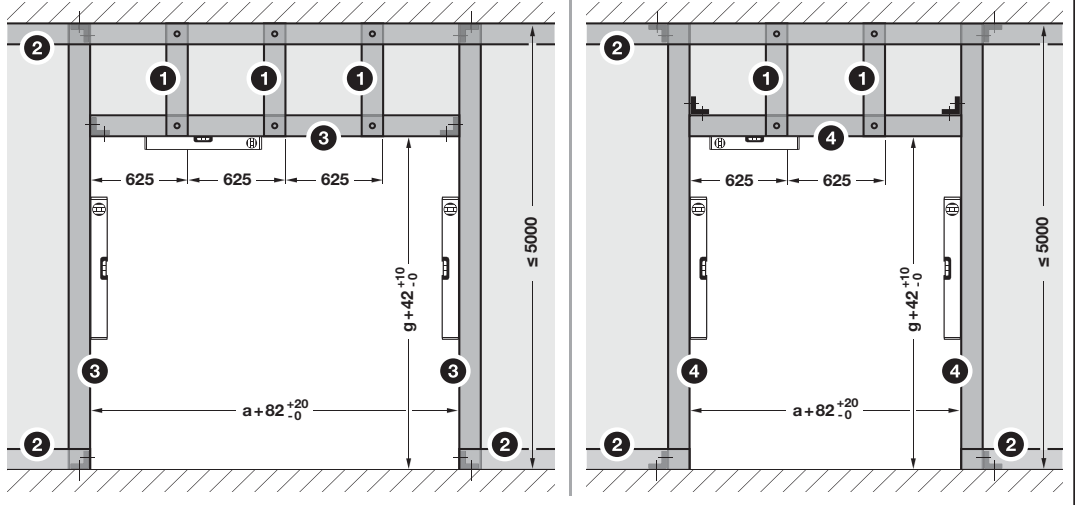
9/D

4.2

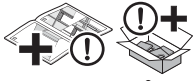
8.10/8.11



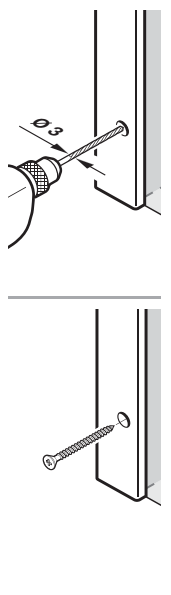
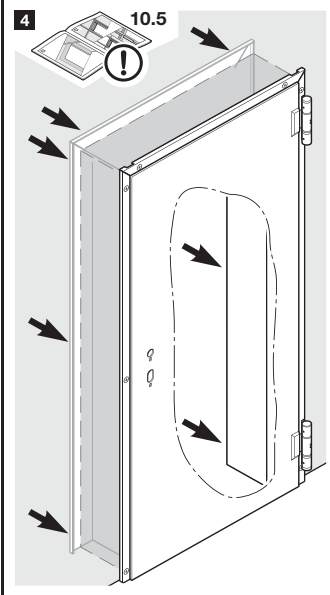
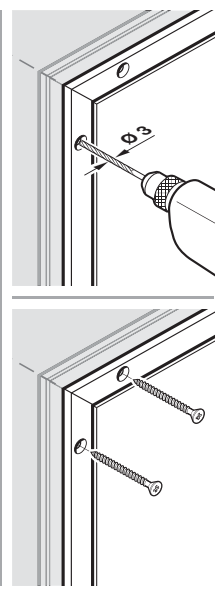
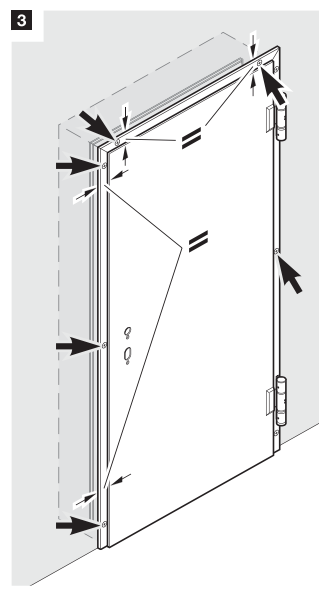
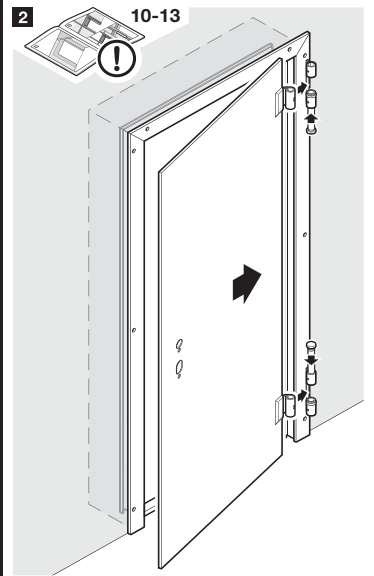
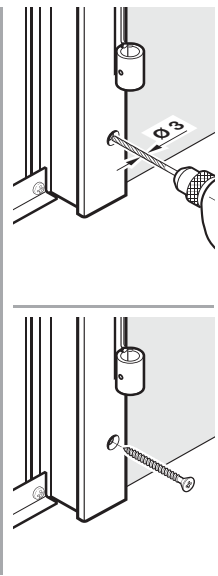
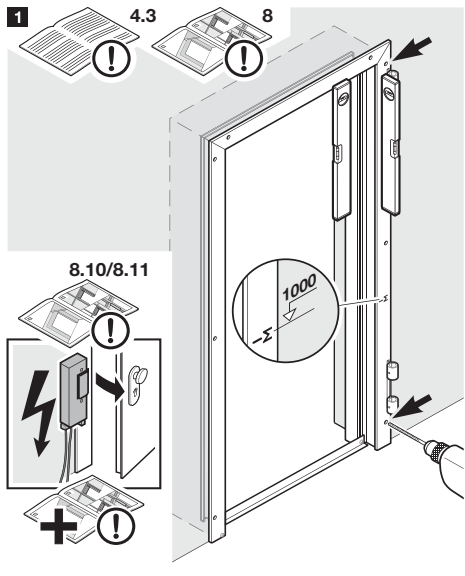
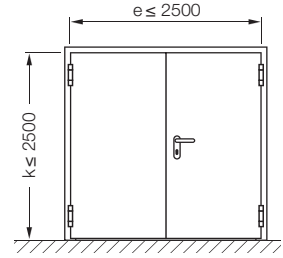
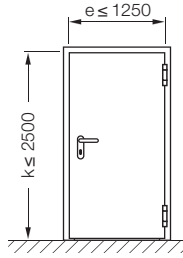
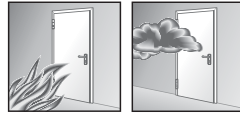
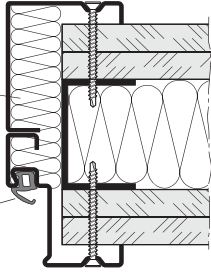
*www.felko-systeme.de/teleskopstuetzen.php

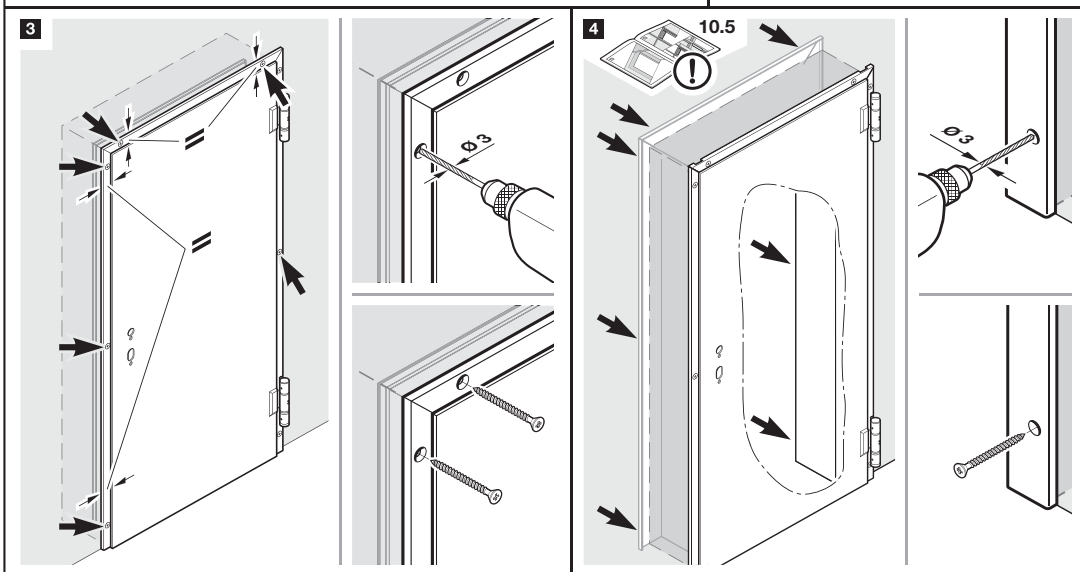
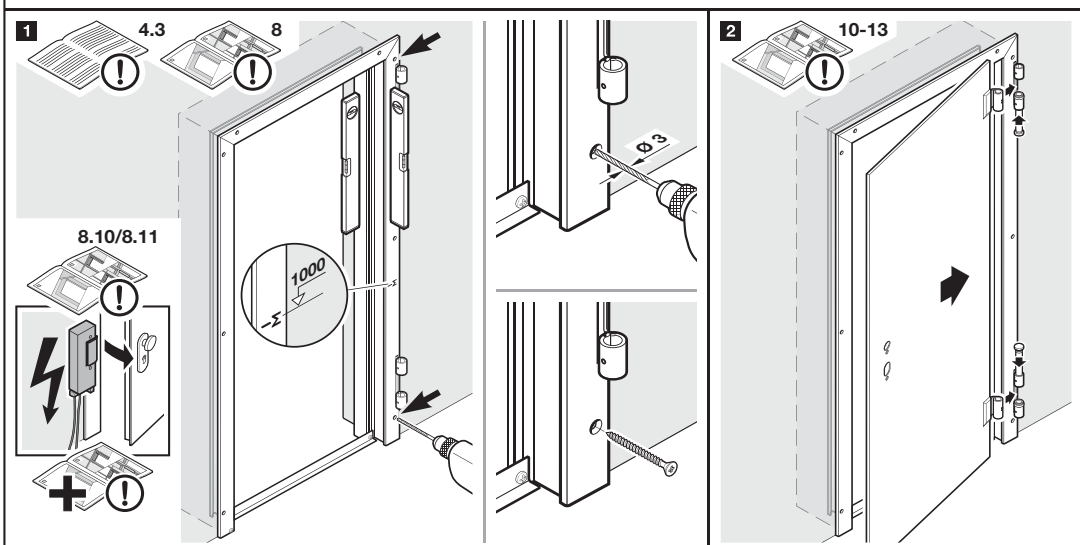
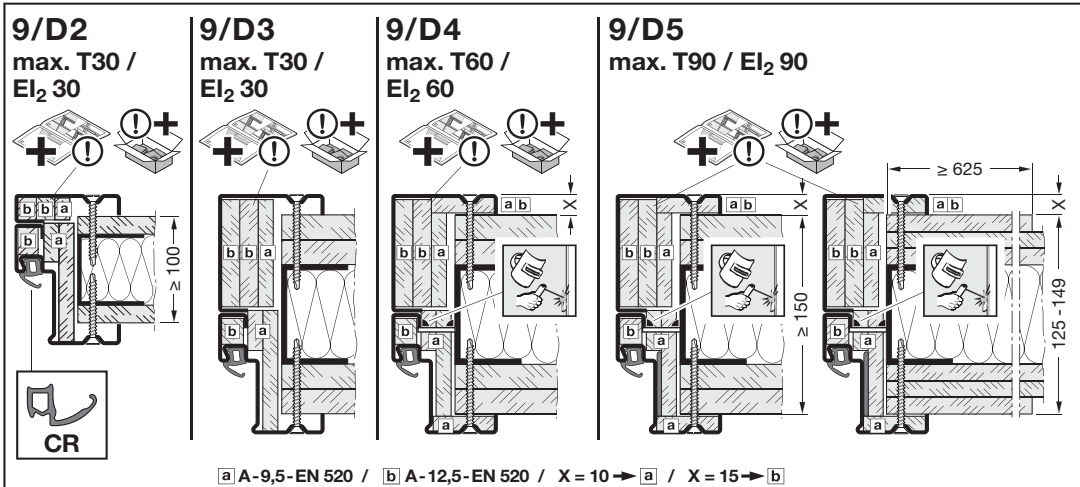


9/D1
max. T30 / EI₂30



$\rho \sim 100 \text{ kg/m}^3$
 A (EN 13501-1)

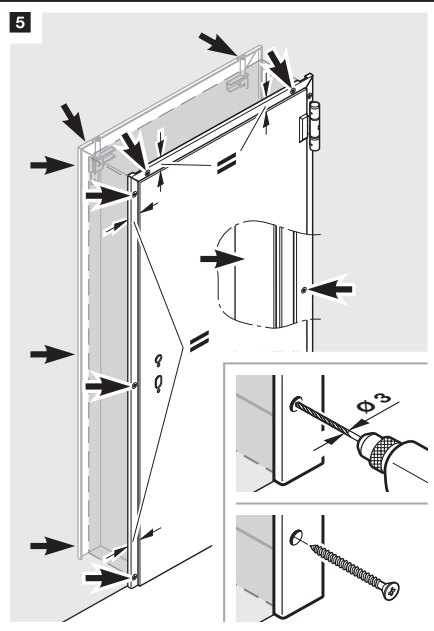
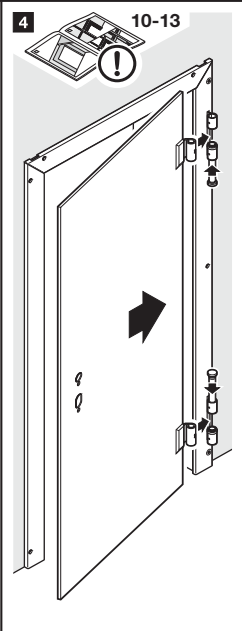
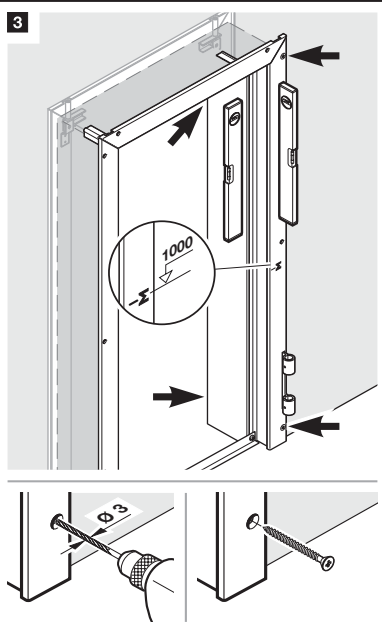
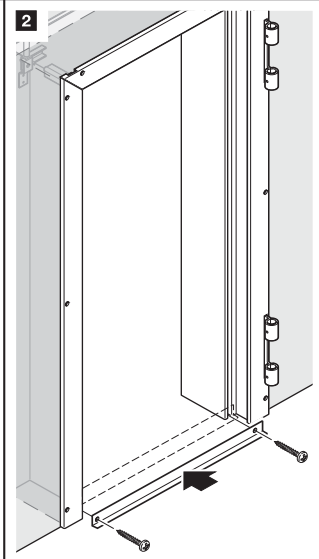
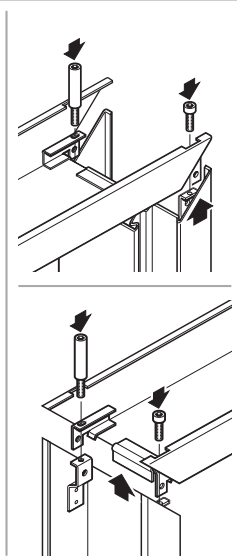
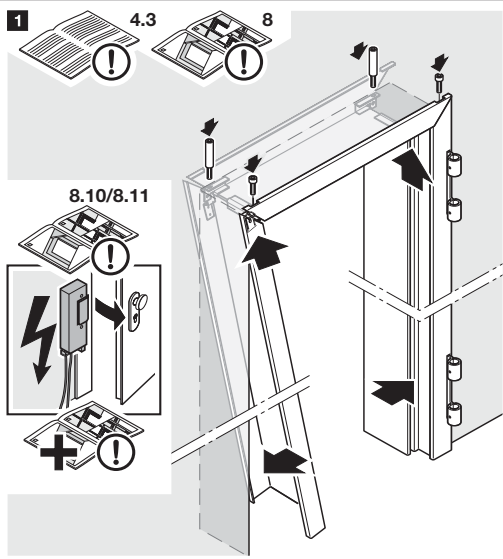
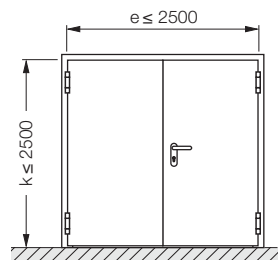
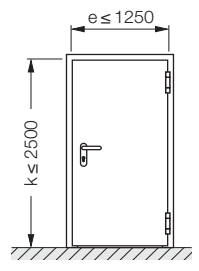
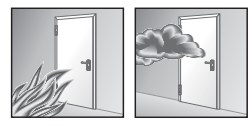
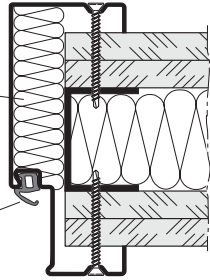




9/D6
max. T30 / EI₂30

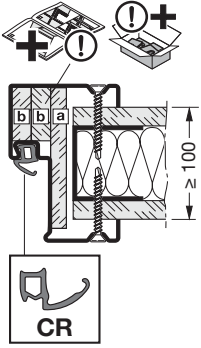


$\rho \sim 100 \text{ kg/m}^3$
 A (EN 13501-1)



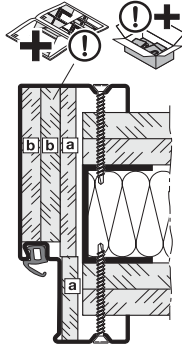
9/D7

max. T30 /
EI₂ 30



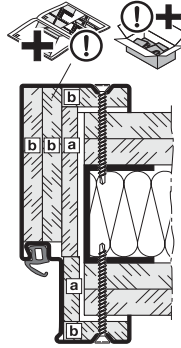
9/D8

max. T30 /
EI₂ 30



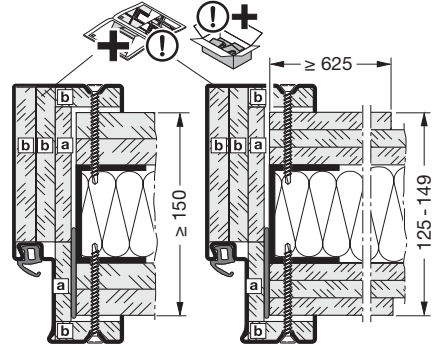
9/D9

max. T60 /
EI₂ 60

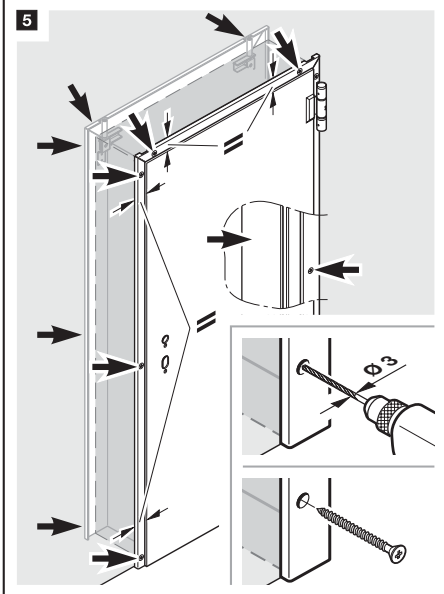
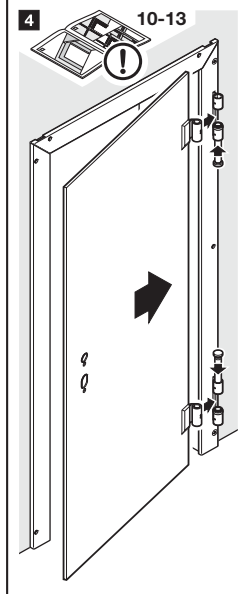
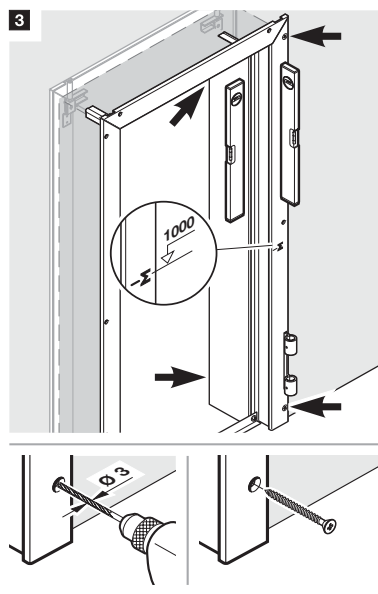
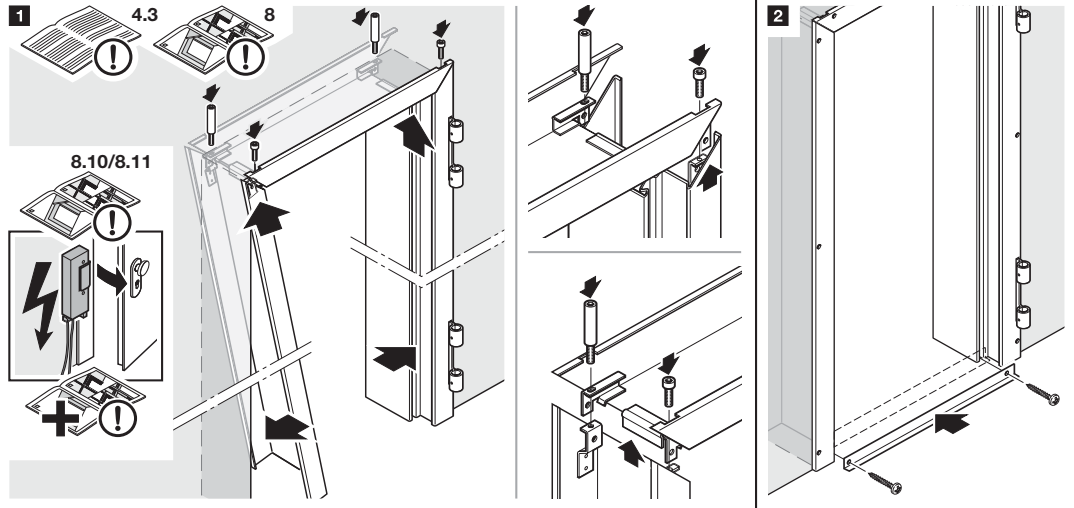


9/D10

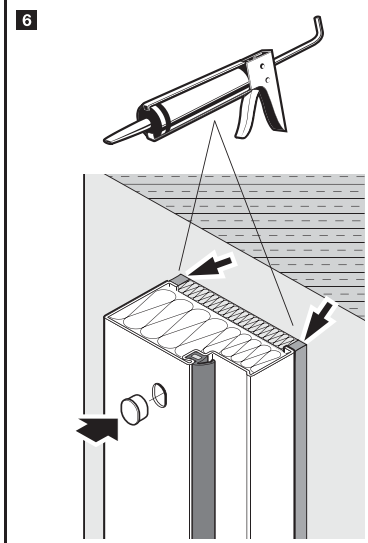
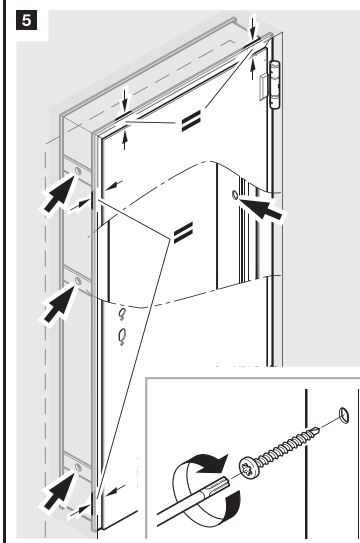
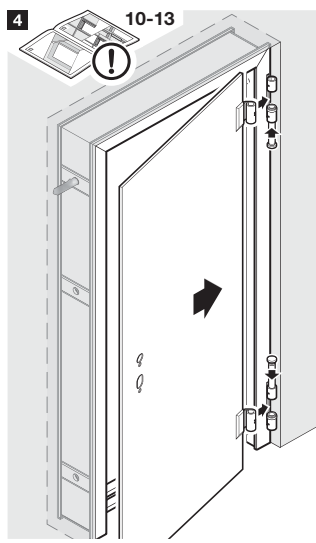
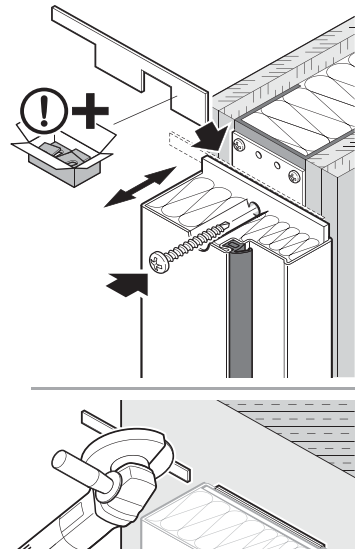
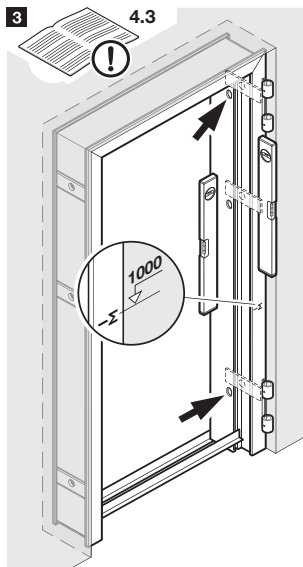
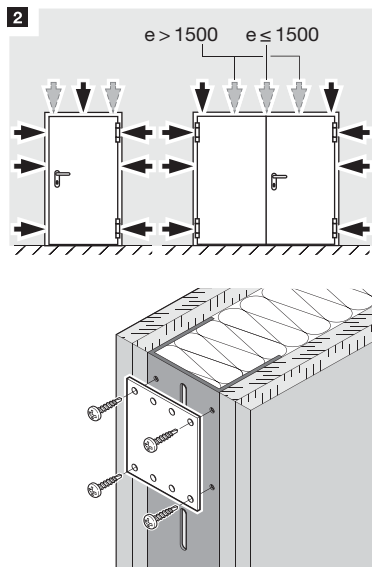
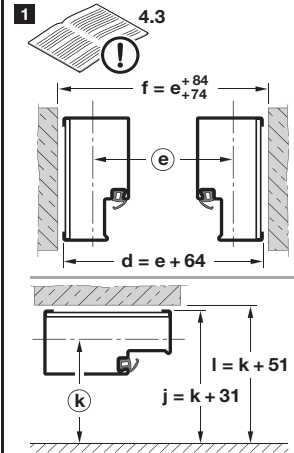
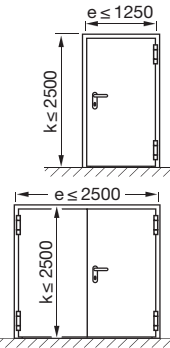
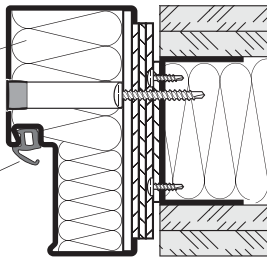
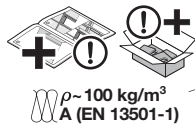
HF60D1/D2, max. T90 / EI₂ 90



a A-9,5-EN 520 / **b** A-12,5-EN 520



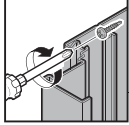
9/D11
max. T30 / EI₂30



9/E1

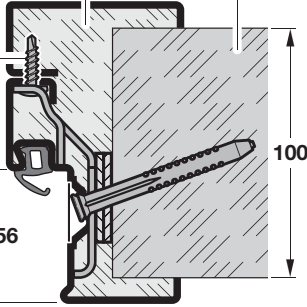


Multi Gips
FG70



DIN 7504 ST
4,8 x 19-N-H
DIN 7981
4,8 x 16

max. 56

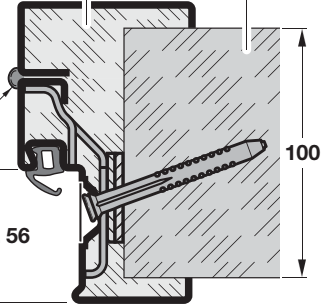


Multi Gips
FG70

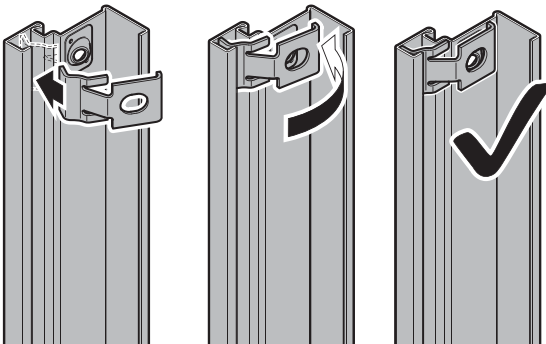
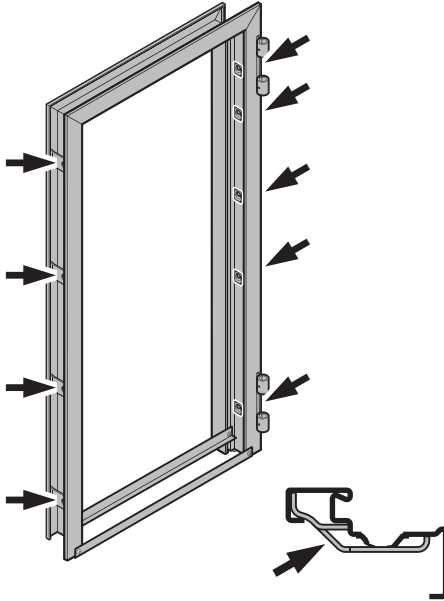


$2\sqrt{x} > 10$

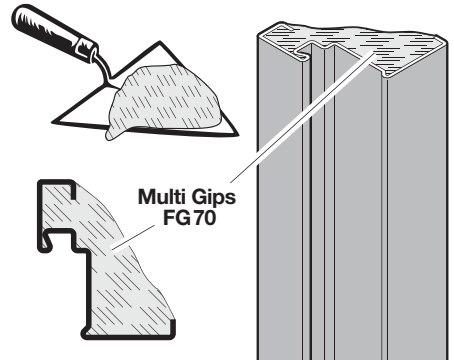
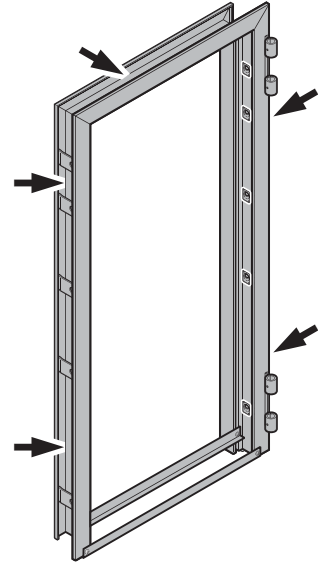
max. 56



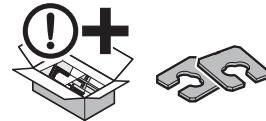
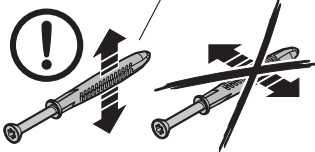
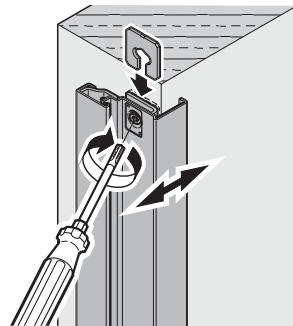
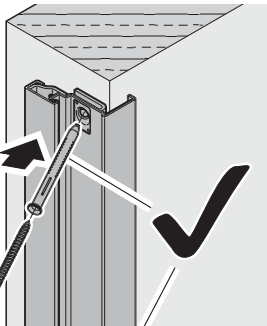
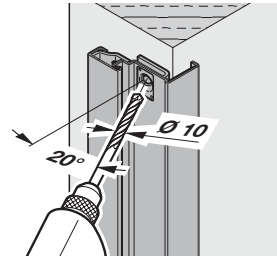
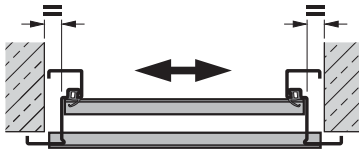
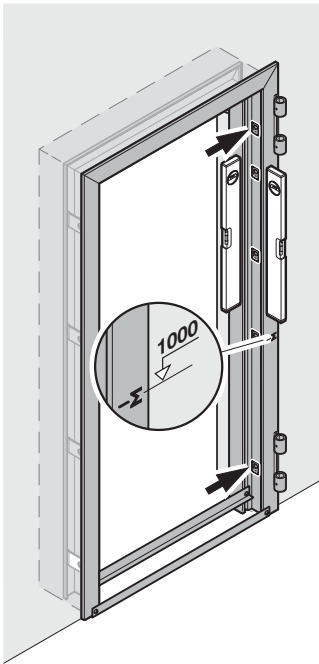
1



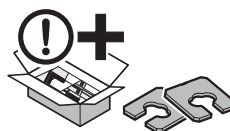
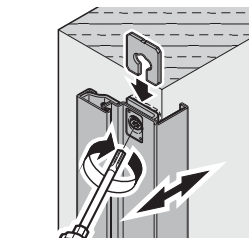
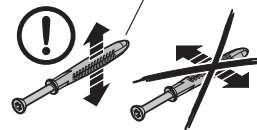
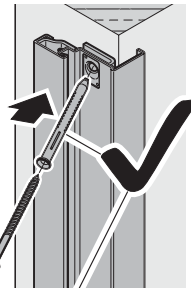
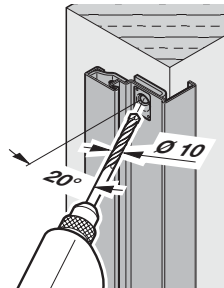
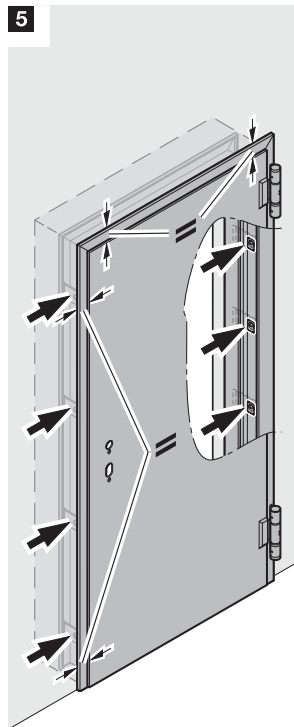
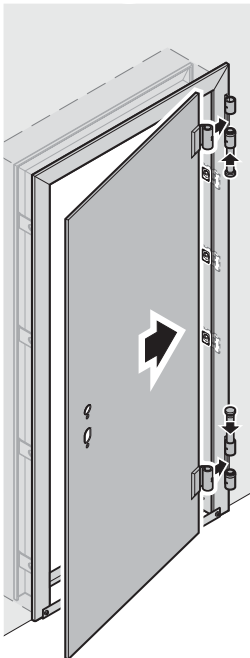
2



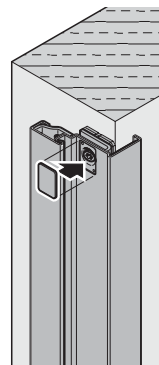
3 4.2/4.3 8

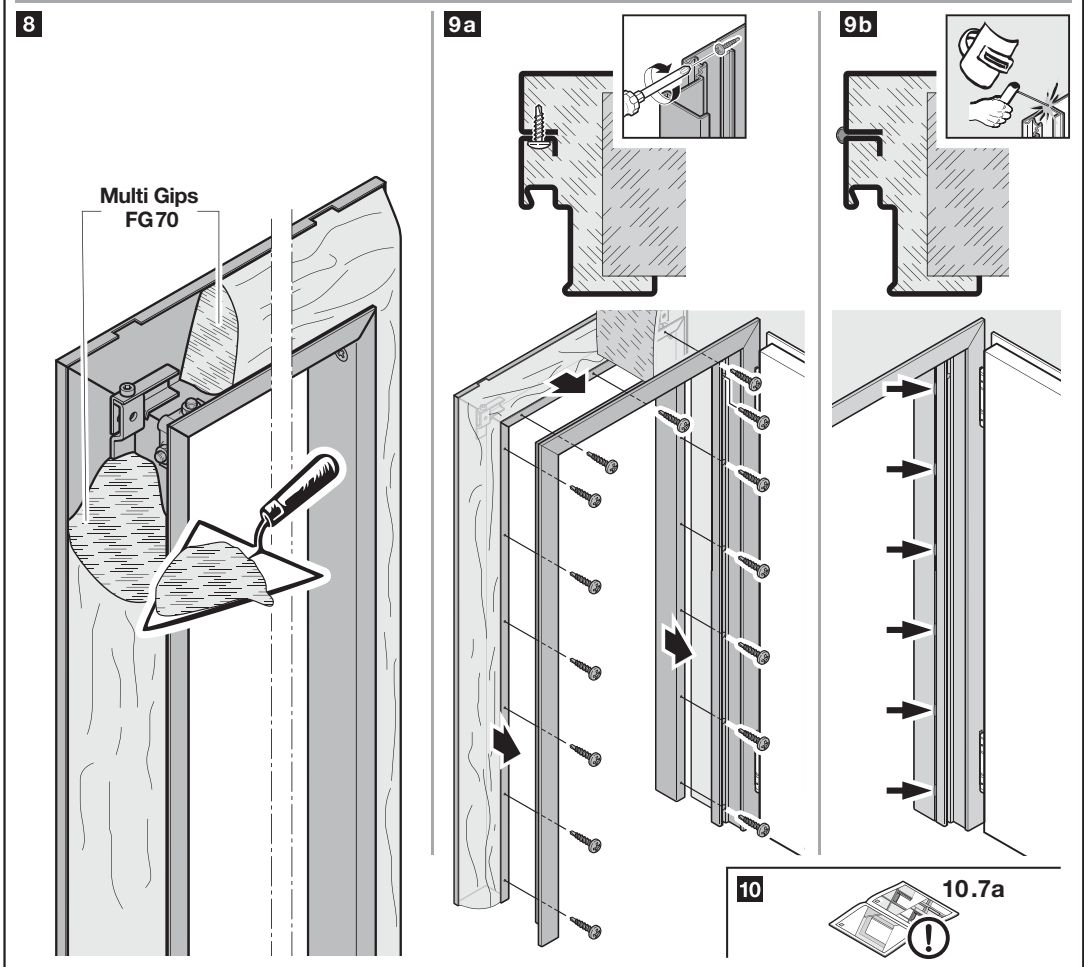
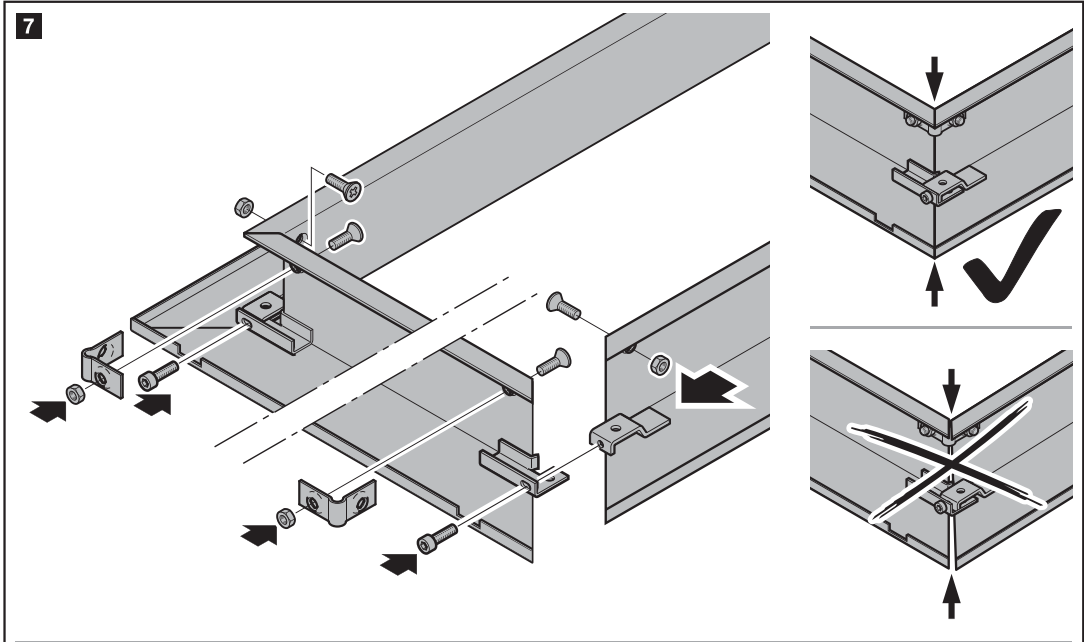


4 10-13

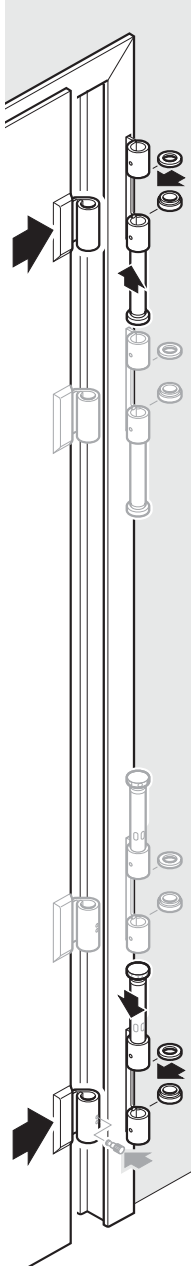
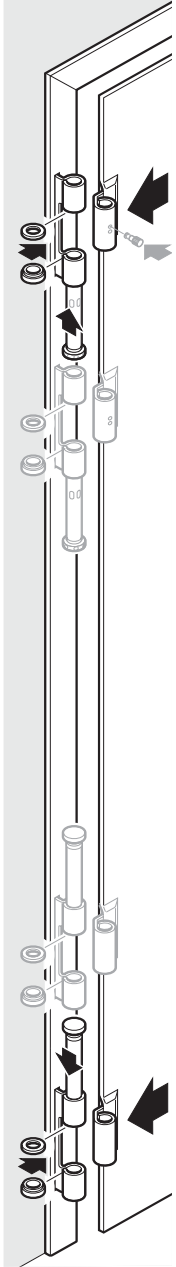
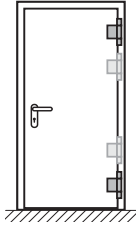
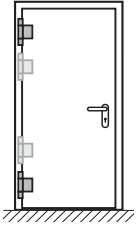


6

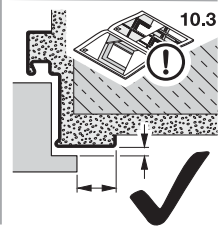
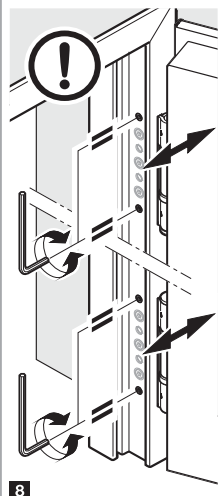
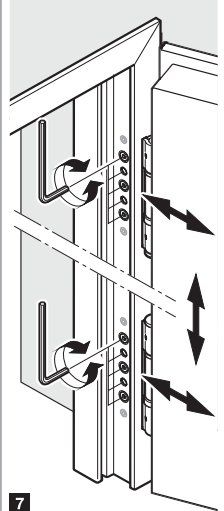
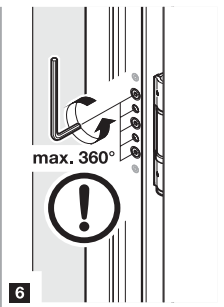
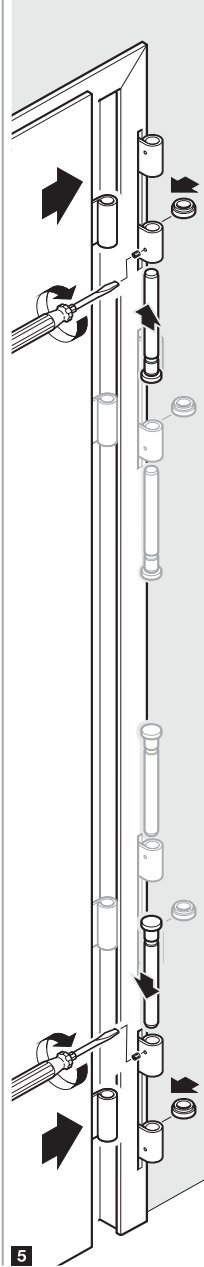
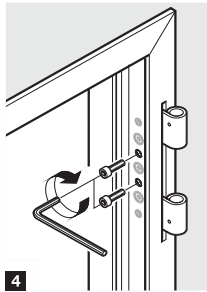
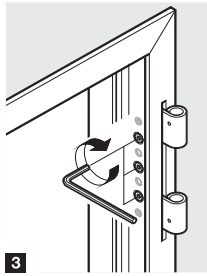
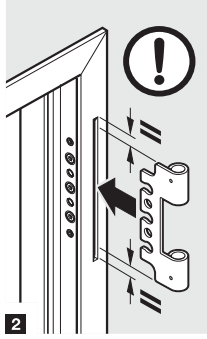
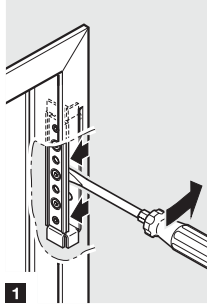
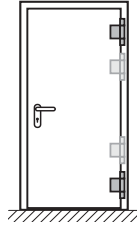




10.1a



10.1b

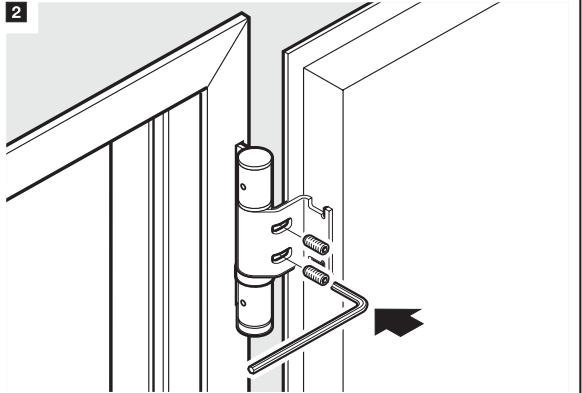
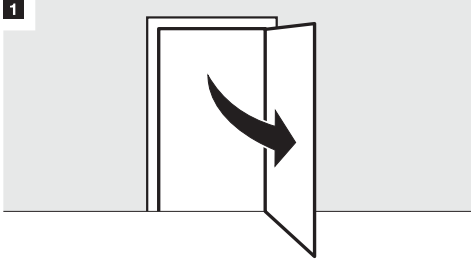


10.2



2

1



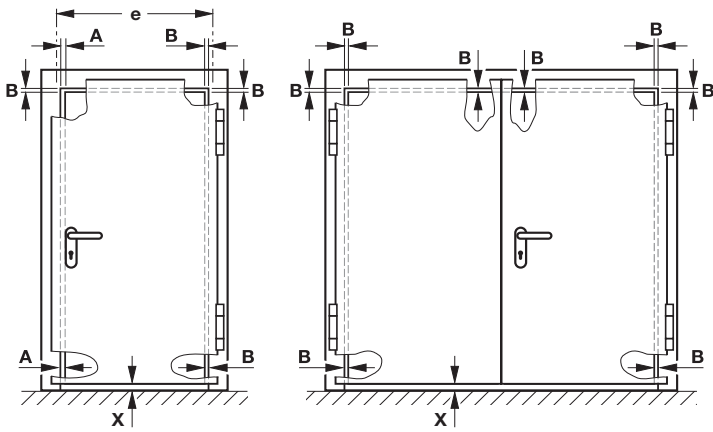
10.3



4.2

| e | A | B | C max. T30 | C T60, T90, T120 |
|-----------|-------------------------------|-------|------------|------------------|
| ≤ 749 | 6 ⁺¹ ₋₂ | 4 ± 2 | 4 ± 2 | 10 ± 2 |
| 750 - 874 | 6 ⁺¹ ₋₂ | | | |
| ≥ 875 | 5 ⁺¹ ₋₂ | | | |

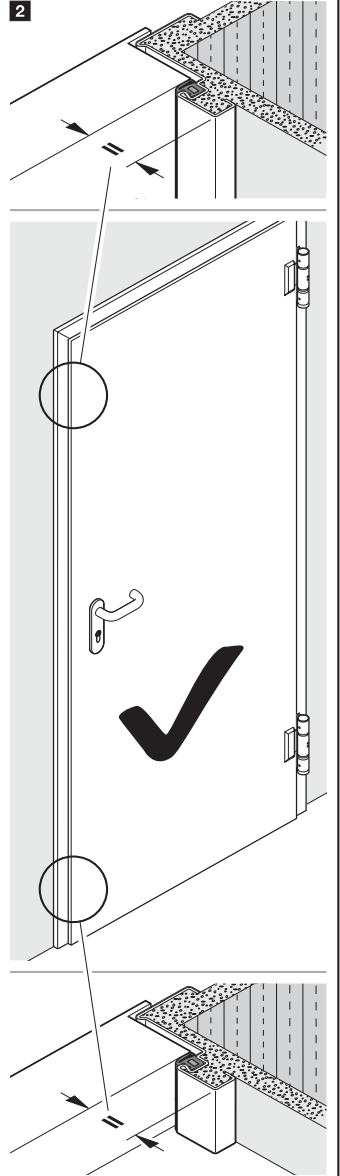
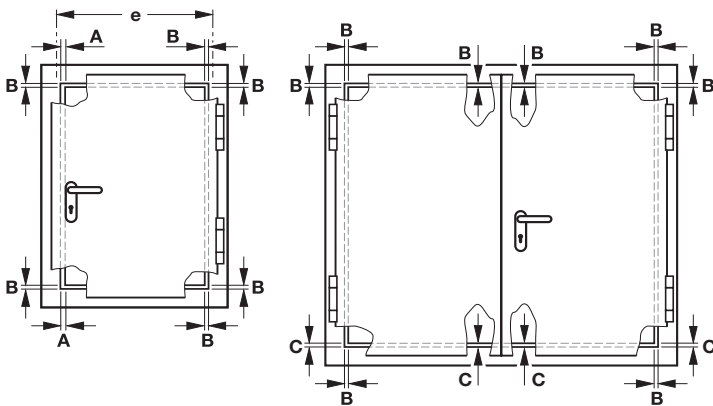
1



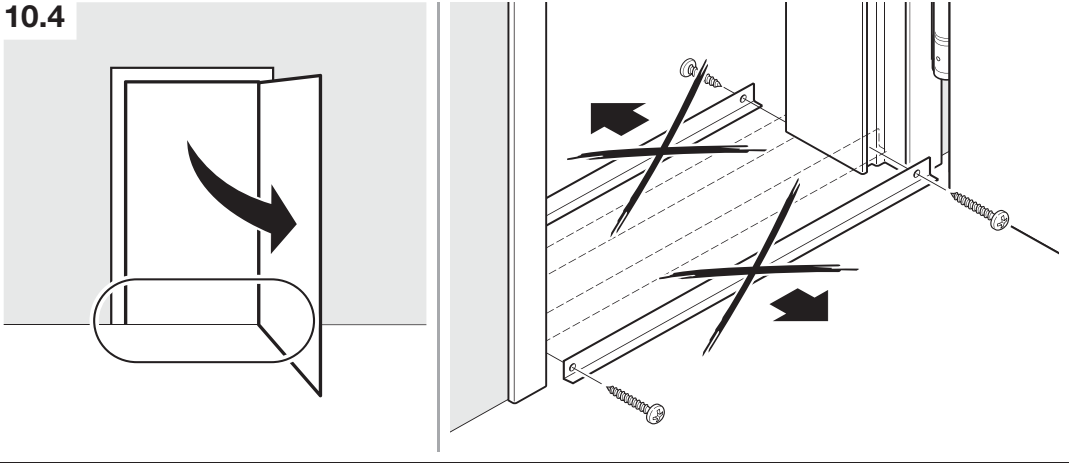
X = 10 ± 5

X = 10⁺²₋₅

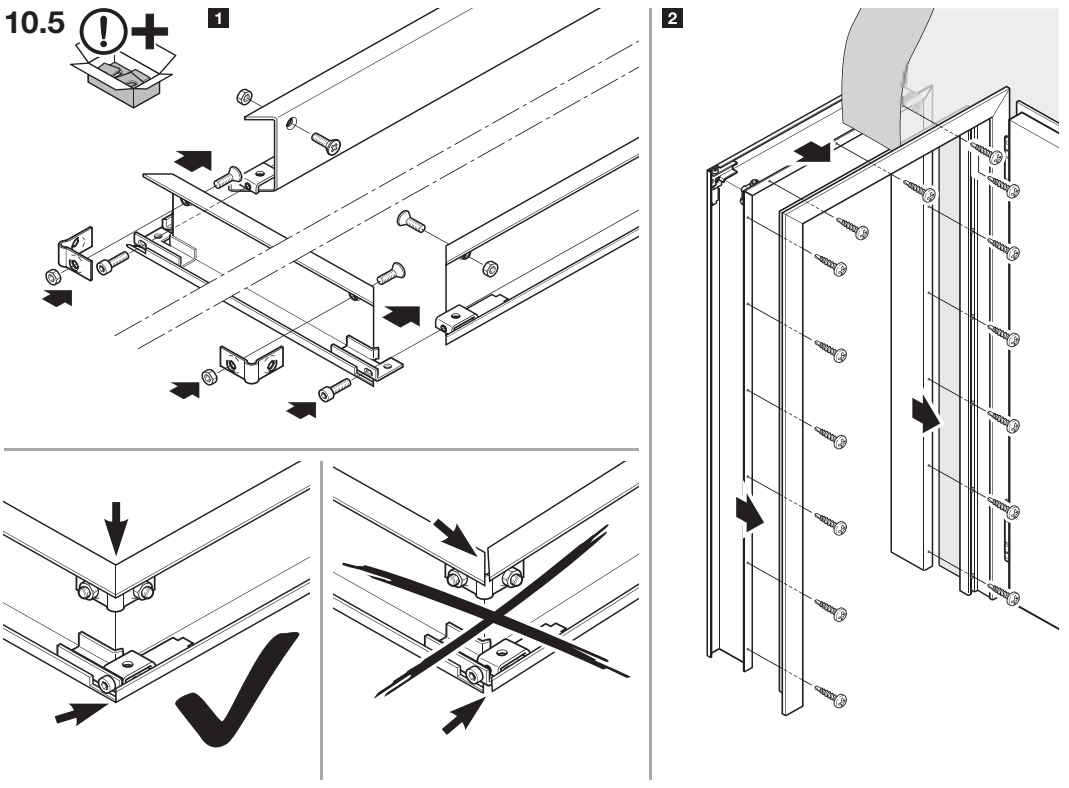
X = 10 - 5



10.4

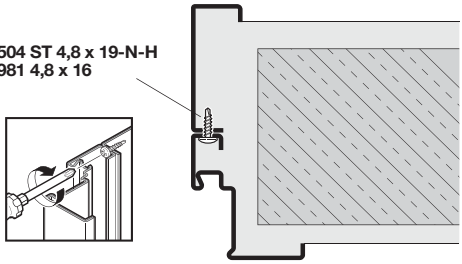


10.5



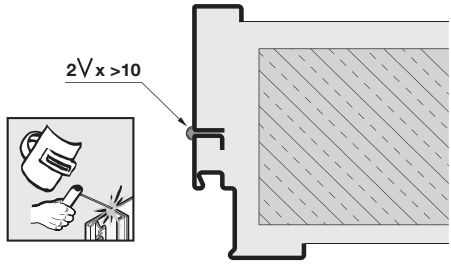
2a

DIN 7504 ST 4,8 x 19-N-H
DIN 7981 4,8 x 16



2b

$2\sqrt{x} > 10$



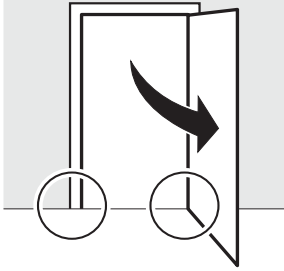
10.6

3.1/3.2



1

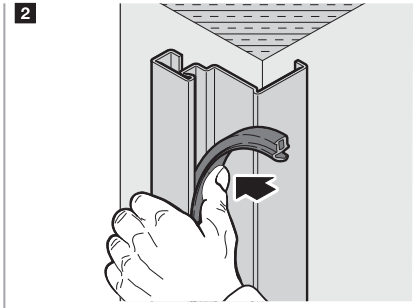
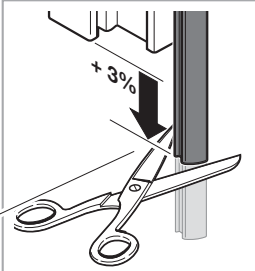
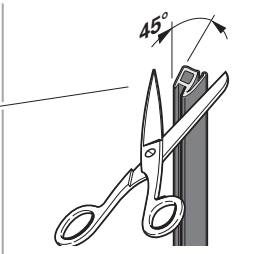
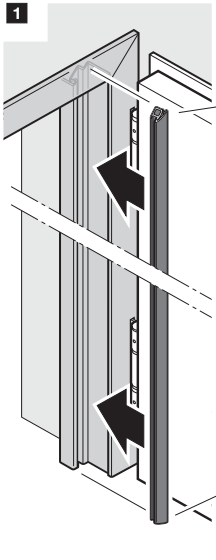
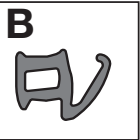
2



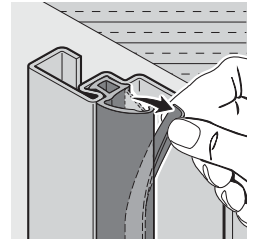
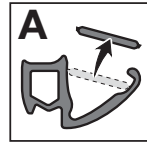
10.7a

1

2

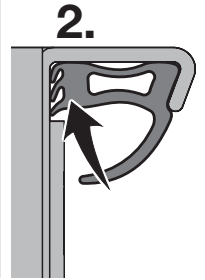
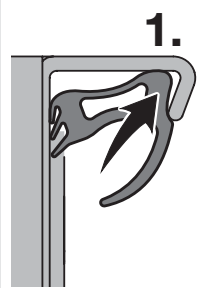
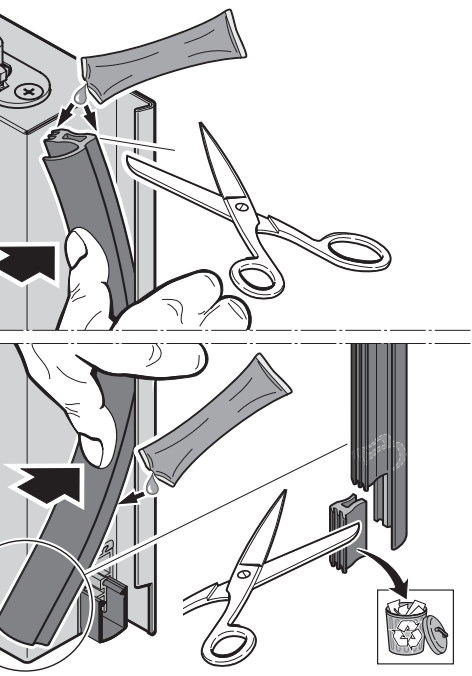
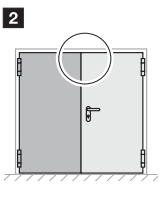
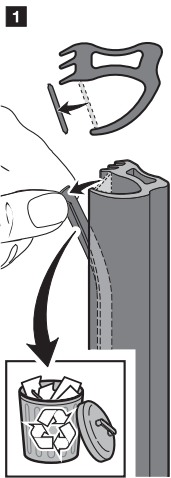


3

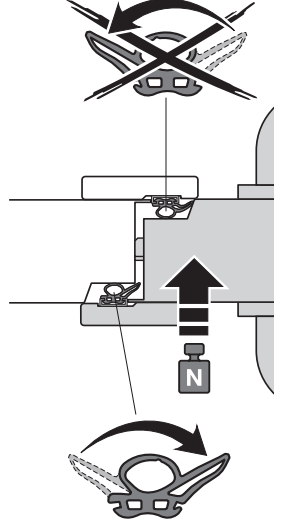
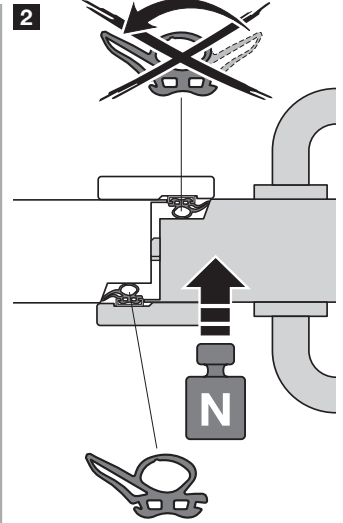
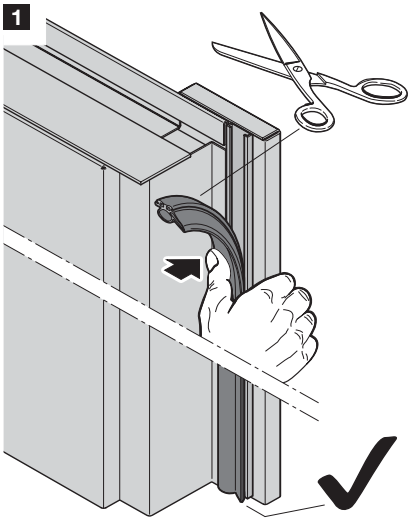
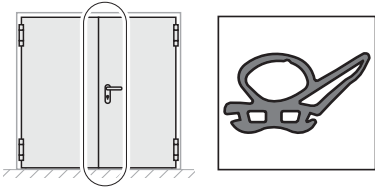


10.7b

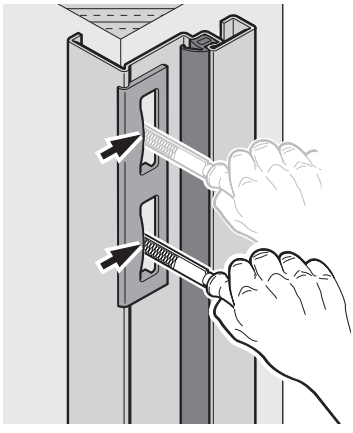
2



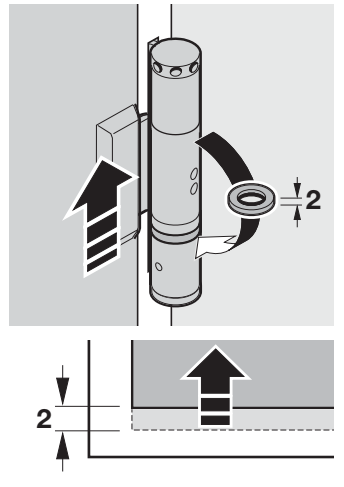
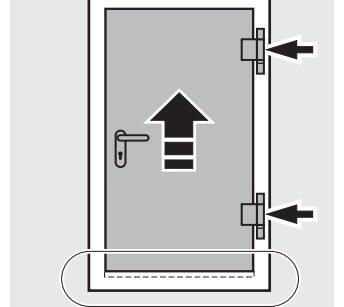
10.7c



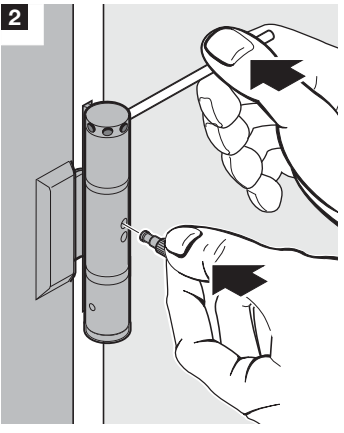
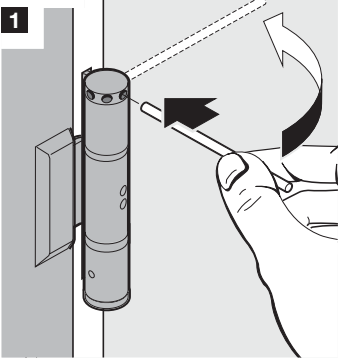
10.8



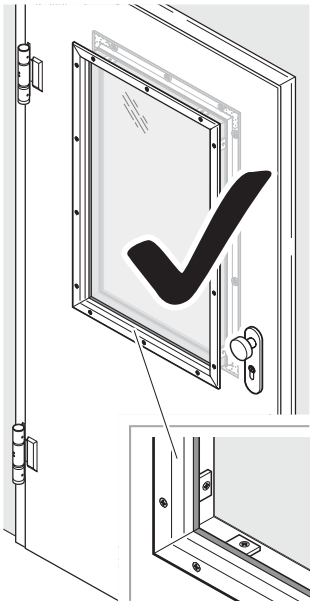
10.9



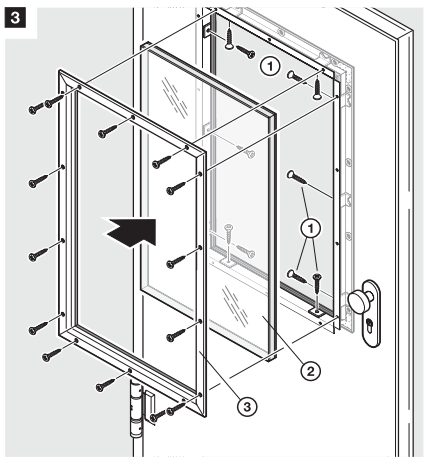
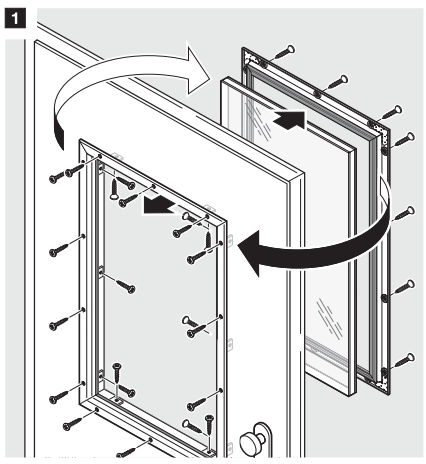
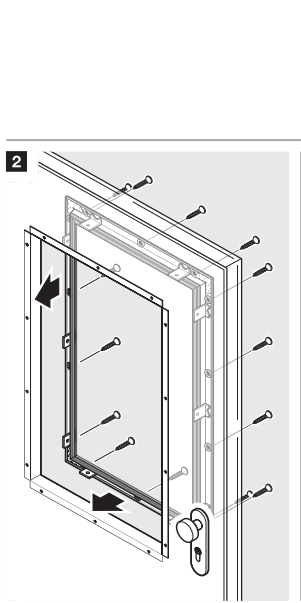
10.10



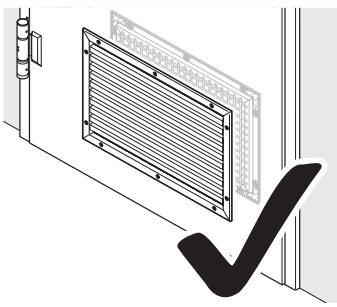
10.11a



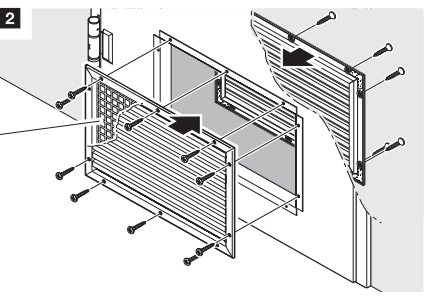
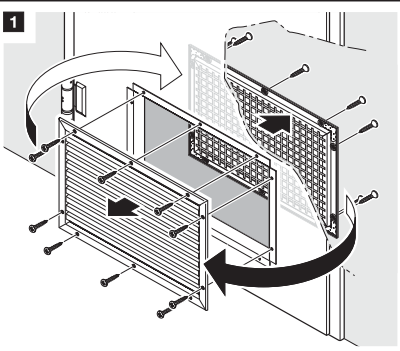
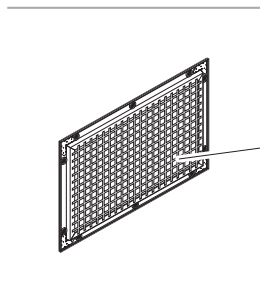
10.11b



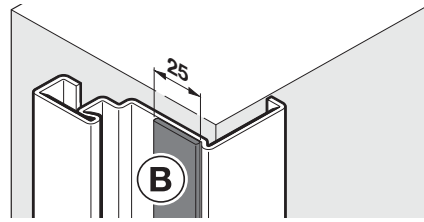
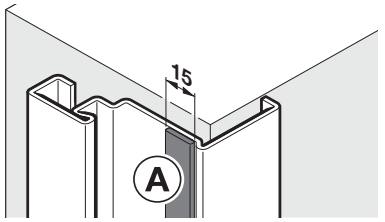
10.12a



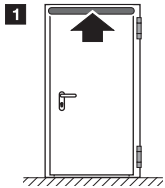
10.12b



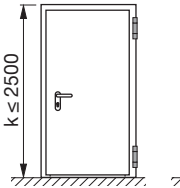
10.13



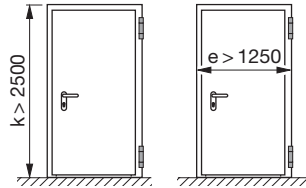
10.13a



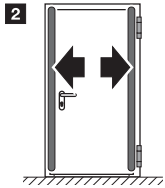
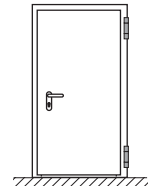
T30 (A)



T30 (B)



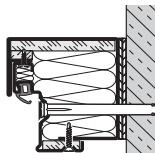
T60/ T90 (B)



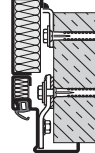
A6
T30 (A)



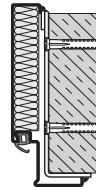
B15
T30 (A)



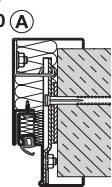
B4
T30 (A)



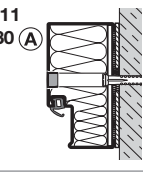
B6 / B8
T30 (A)



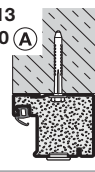
B9
T30 (A)



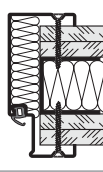
B11
T30 (A)



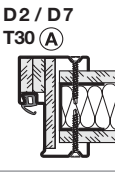
B13
T30 (A)



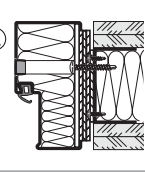
D1 / D6
T30 (A)



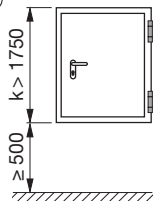
D2 / D7
T30 (A)



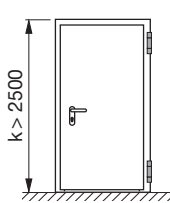
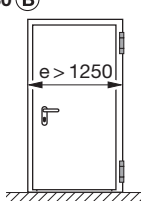
D11
T30 (A)



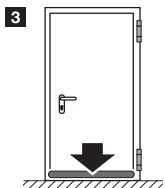
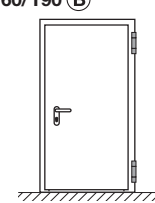
T30 (A)



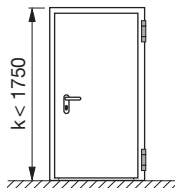
T30 (B)



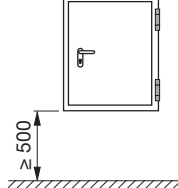
T60/T90 (B)



T30 (A)
T60 (B)
T90 (B)

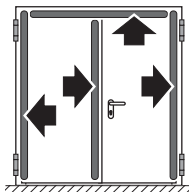


T30 (A)
T60 (B)
T90 (B)

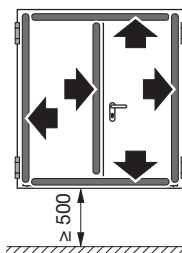


10.13b

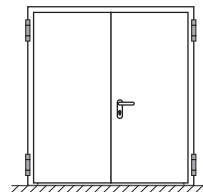
T30 (A)
T60/T90 (B)



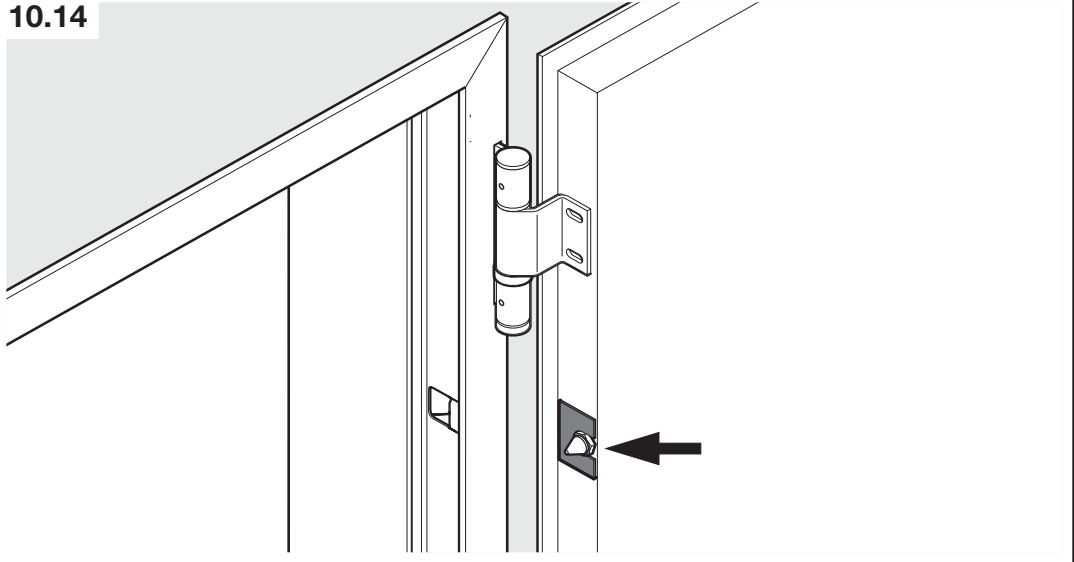
T30 (A)
T60 (B)



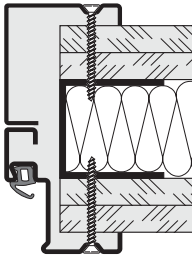
HBS



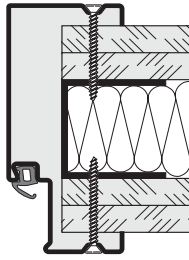
10.14



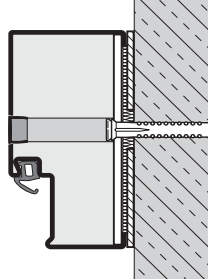
D1-D4



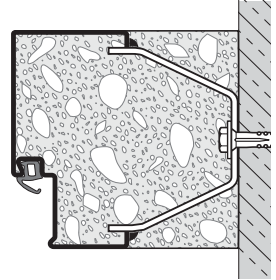
D5-D8



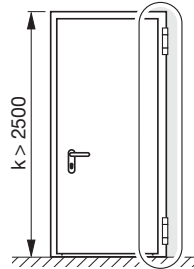
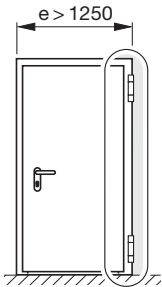
B10, B11



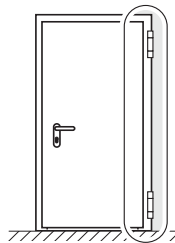
B12



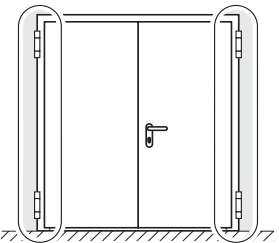
T30-1 / H_30-1



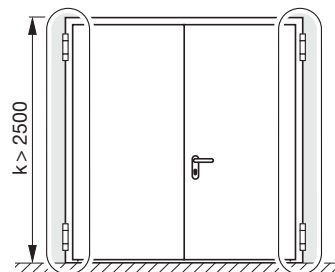
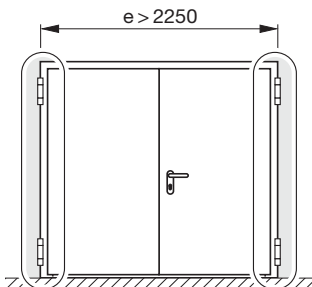
**T60-1 / H_60-1
T90-1 / H_90-1**



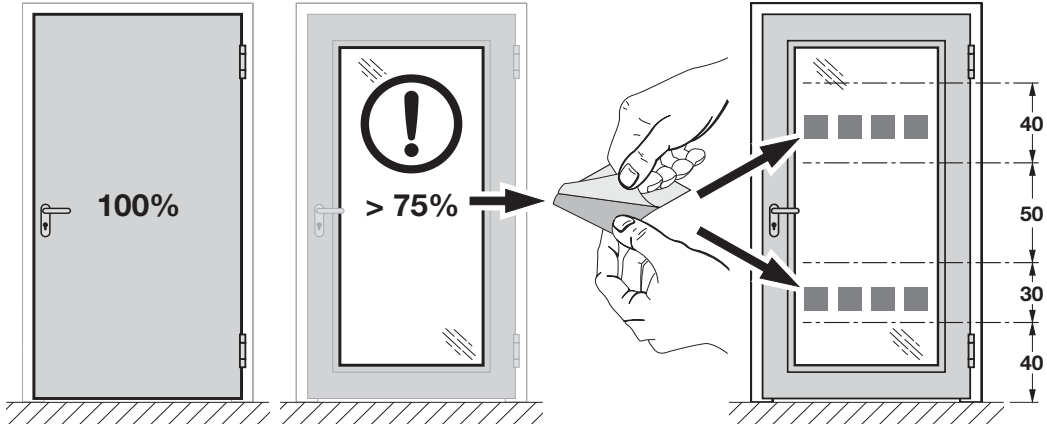
T30-2 RC3 / H_30-2 RC3



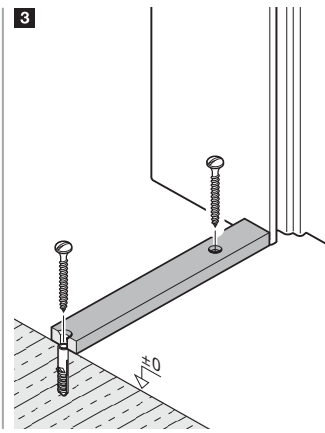
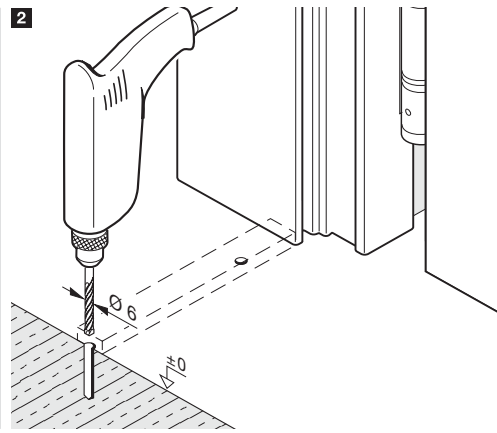
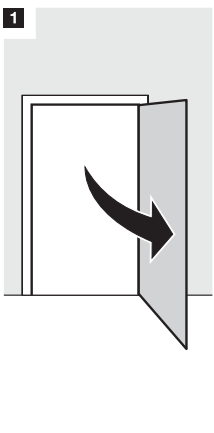
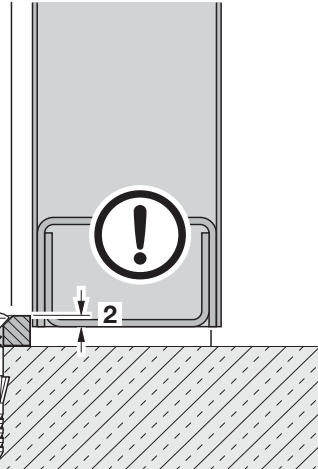
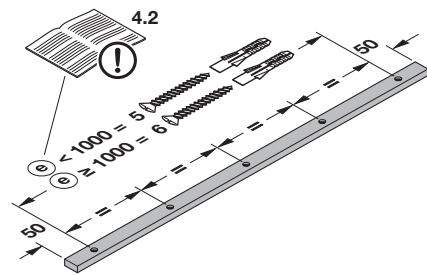
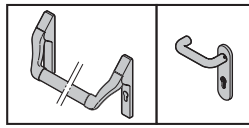
**T60-2 / H_60-2
T90-2 / H_90-2**



10.15

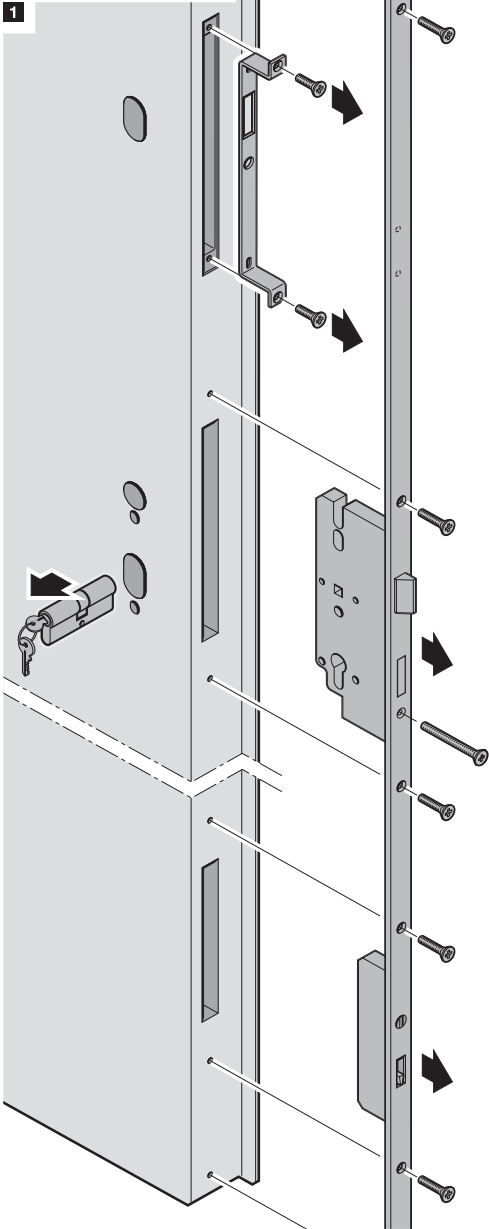


10.16

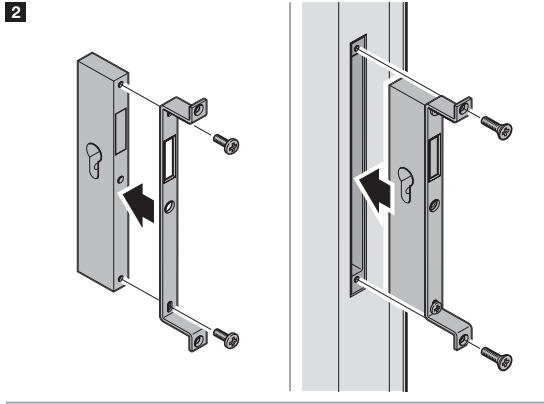


10.17

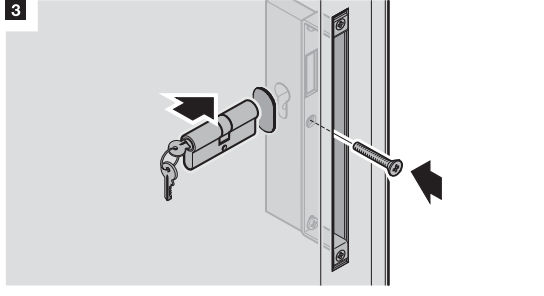
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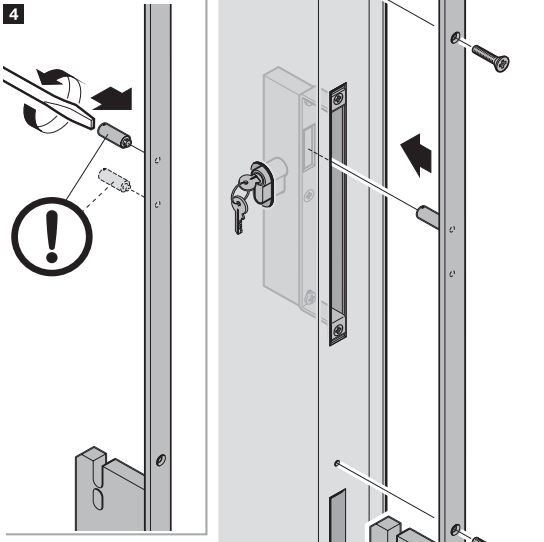
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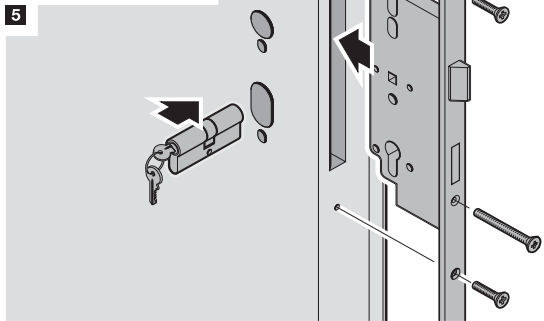
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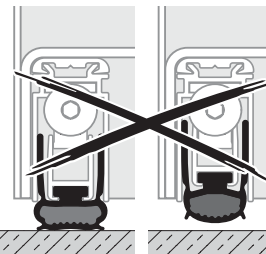
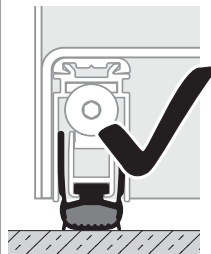
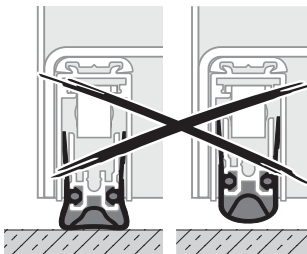
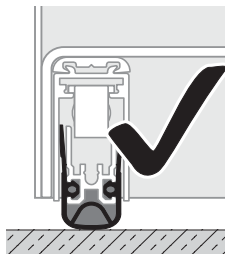
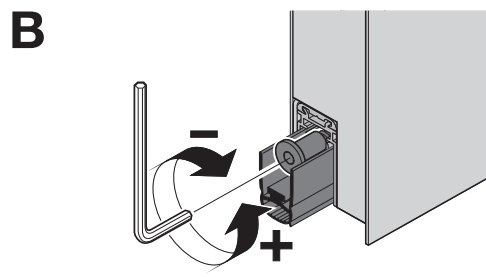
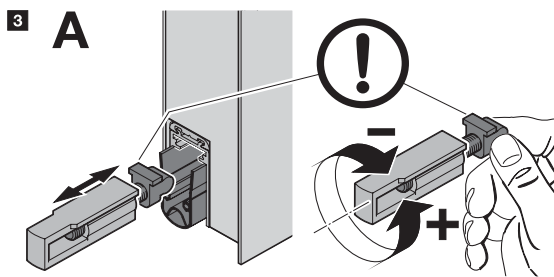
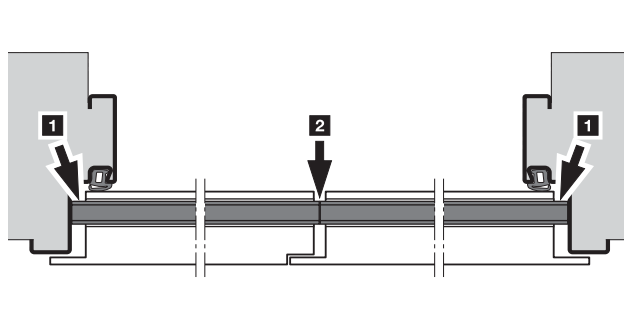
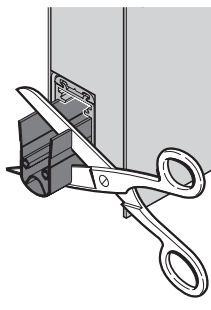
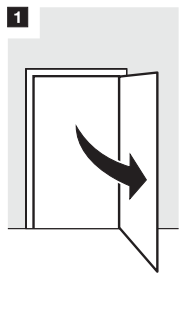
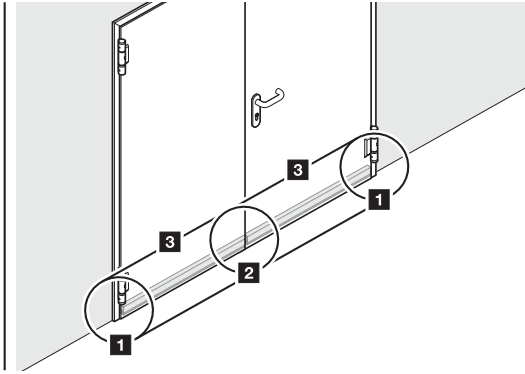
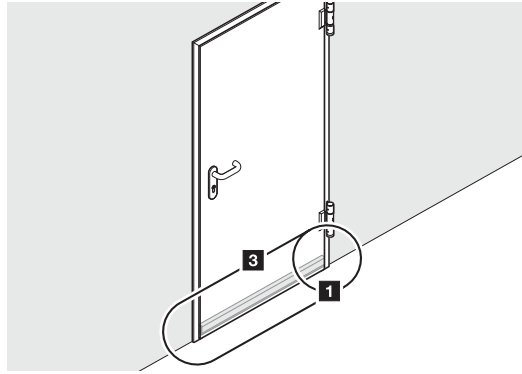
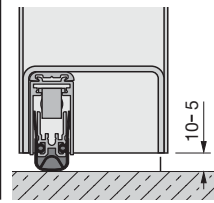
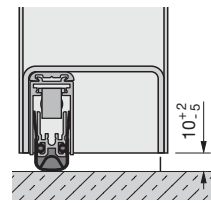
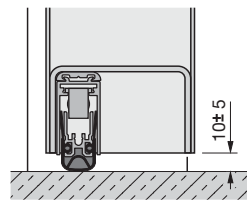
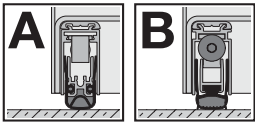
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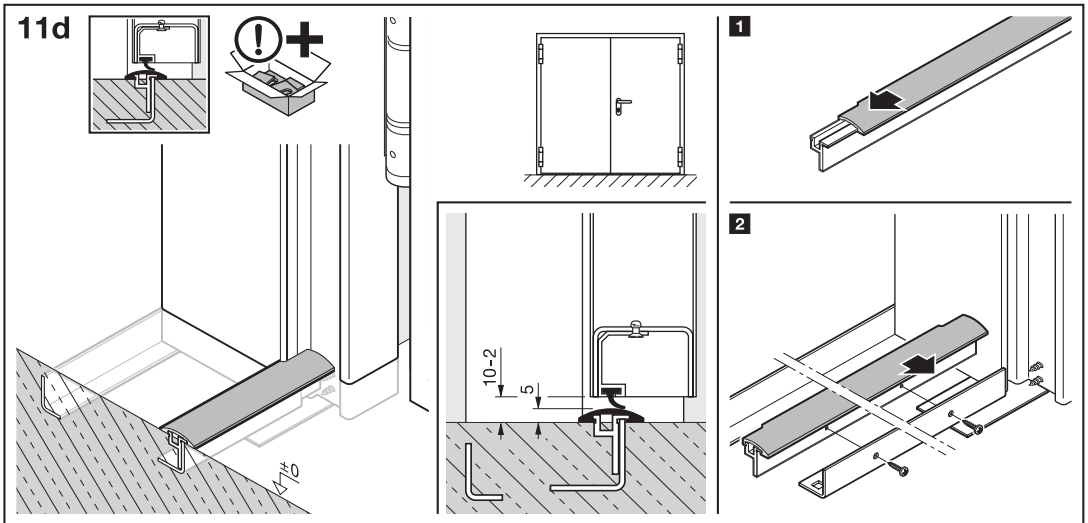
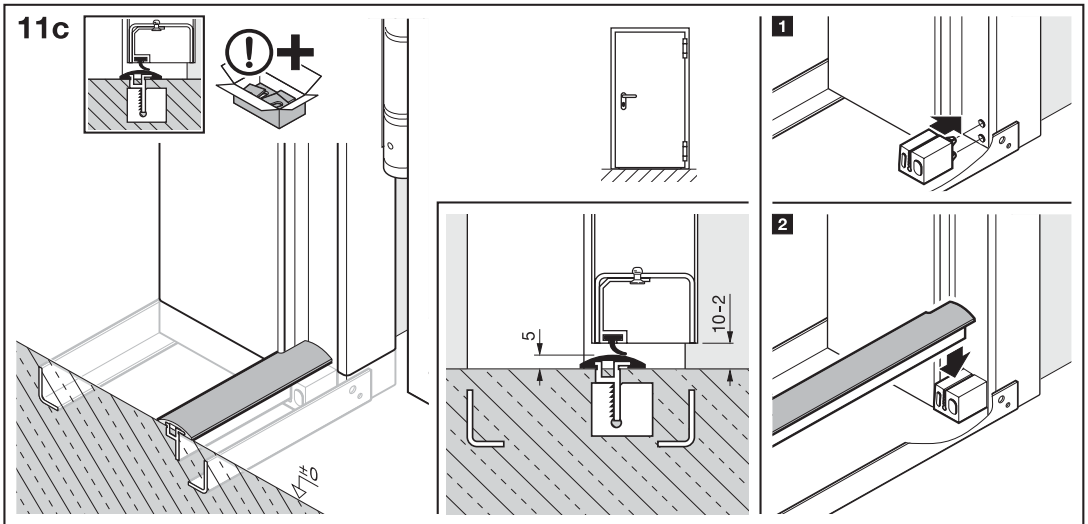
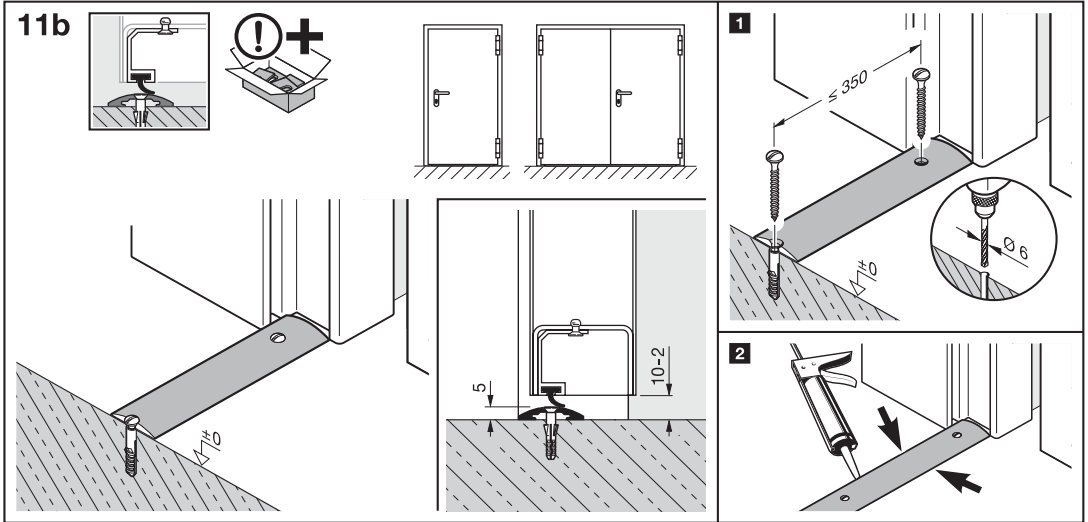


5

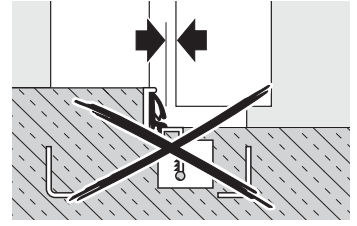
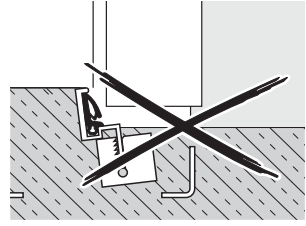
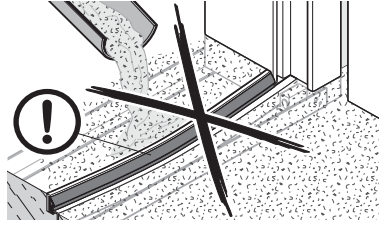
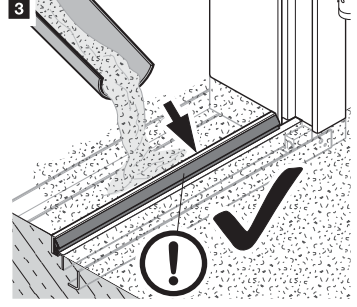
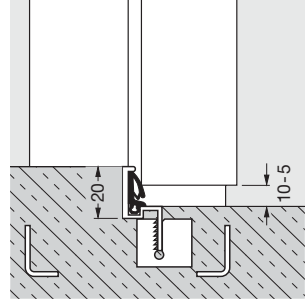
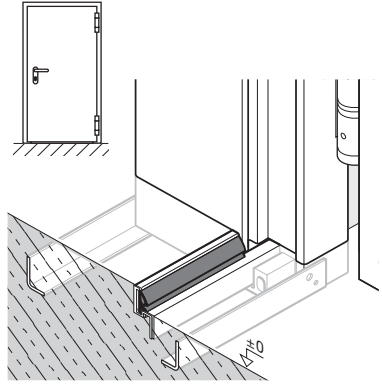
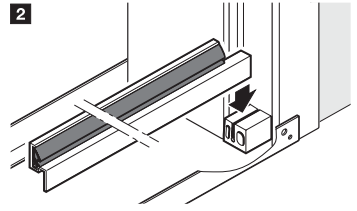
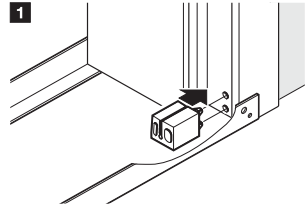
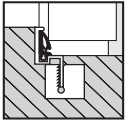


11a

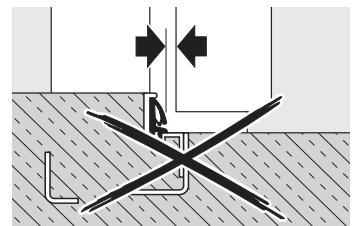
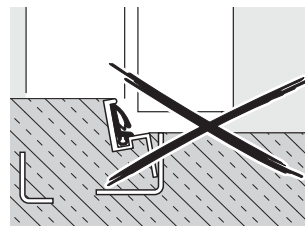
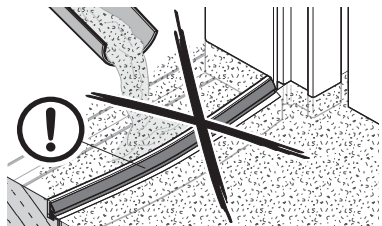
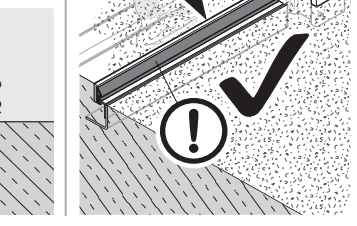
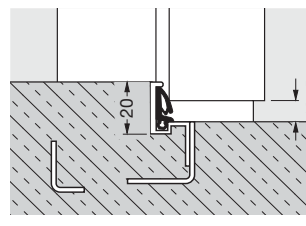
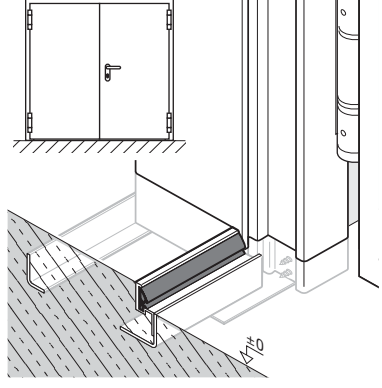
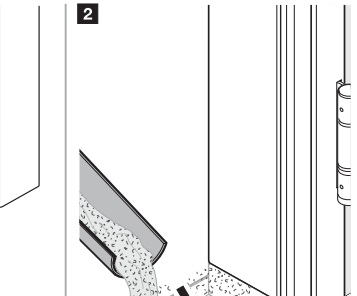
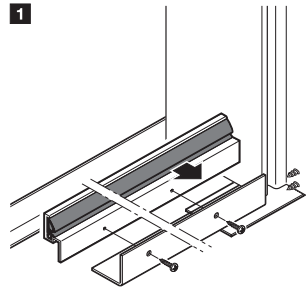
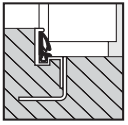




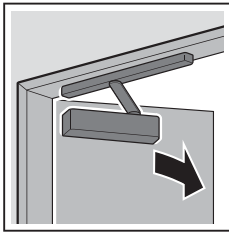
11e



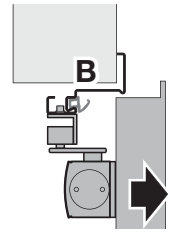
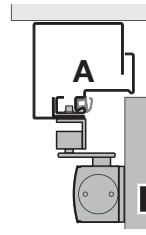
11f



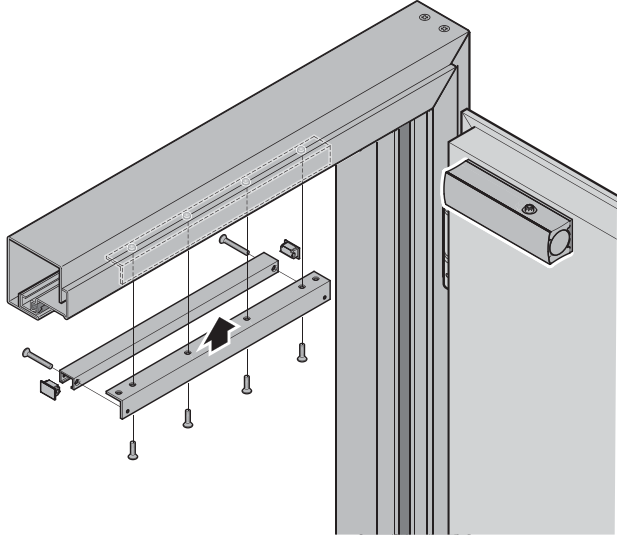
12a



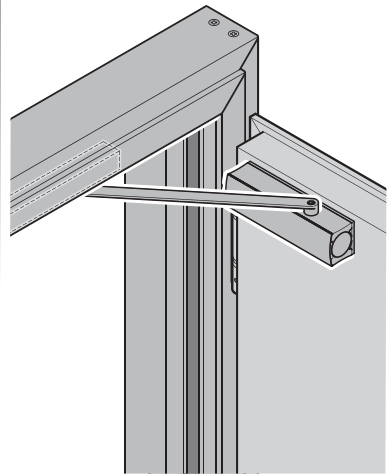
HDC 35 BG



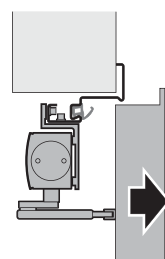
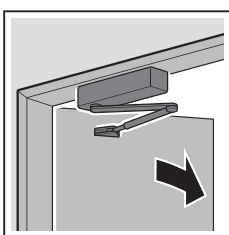
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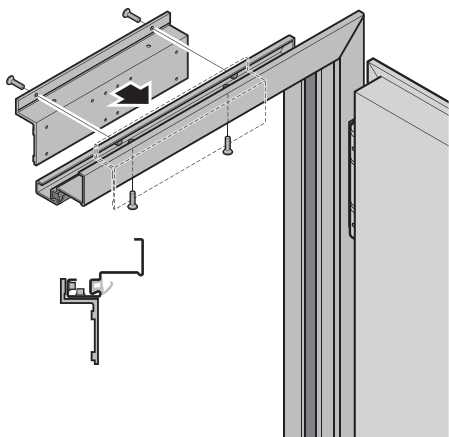
2



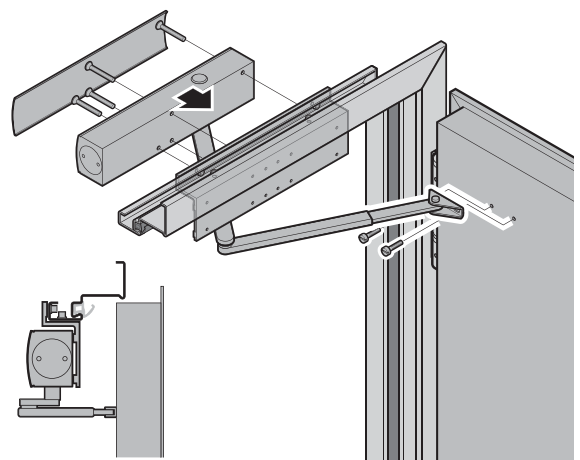
12b



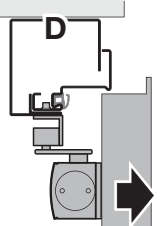
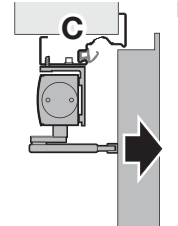
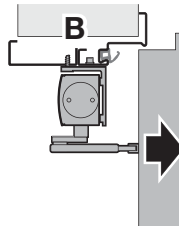
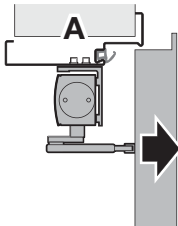
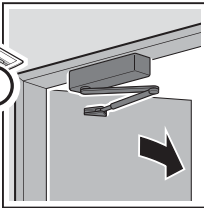
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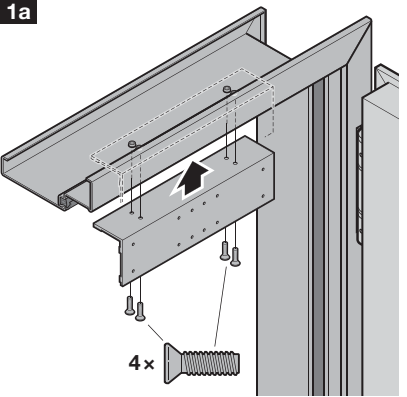
2



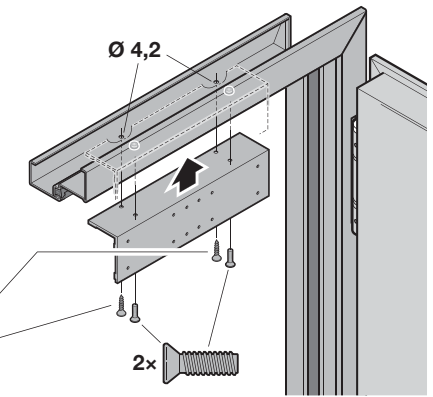
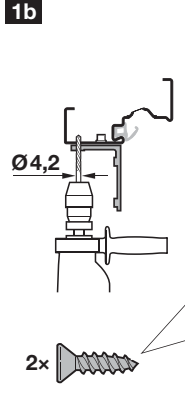
12c



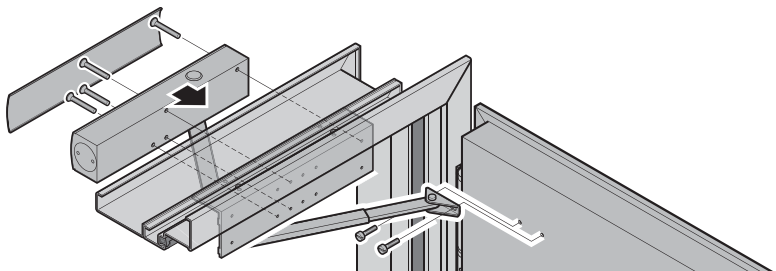
1a



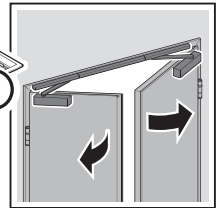
1b



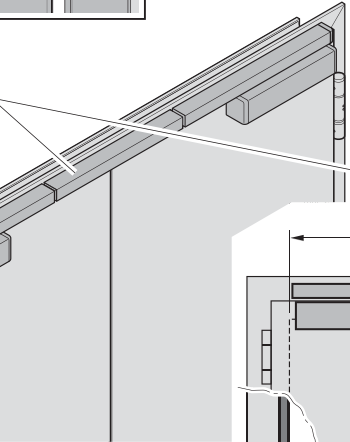
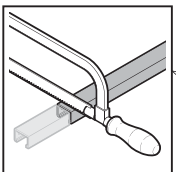
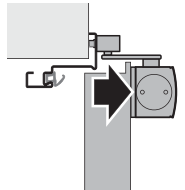
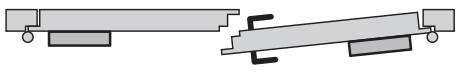
2



12d



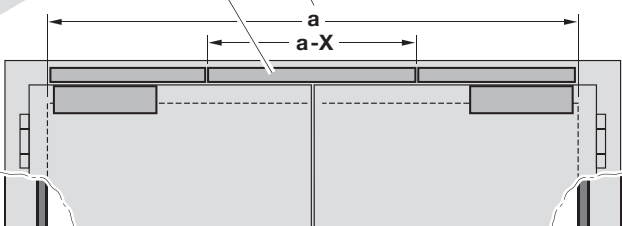
**GEZE TS 5000
DORMA TS 93**



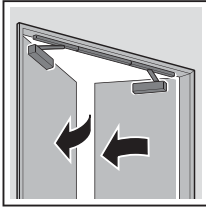
4.2 (EN 12519)



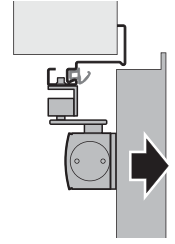
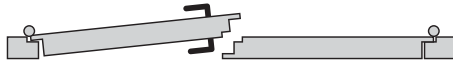
| | X |
|--------------|------|
| GEZE TS 5000 | 1021 |
| DORMA TS 93 | 1062 |



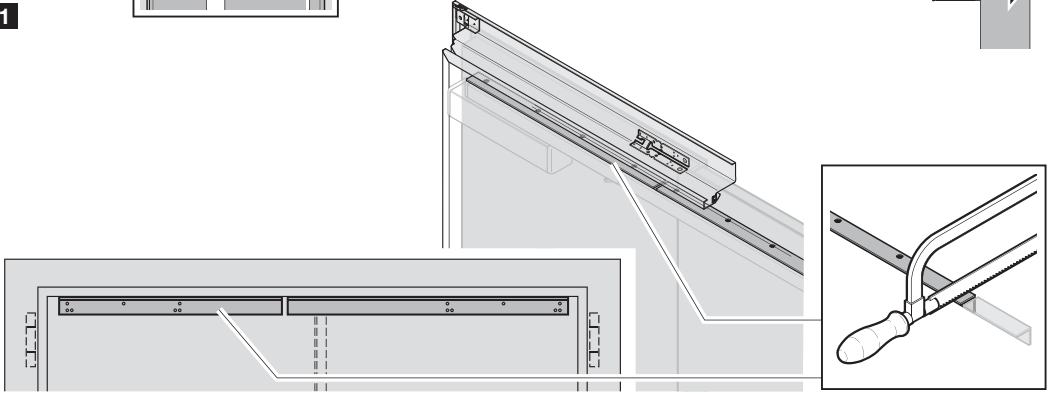
12e



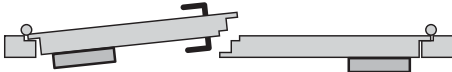
GEZE TS 5000 DORMA TS 93



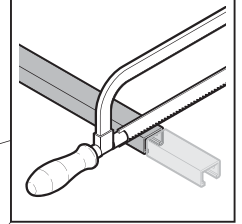
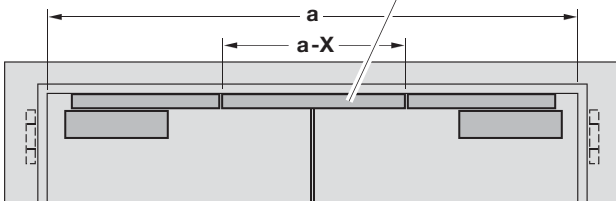
1



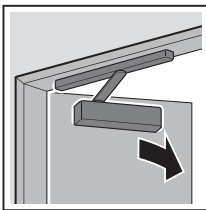
2



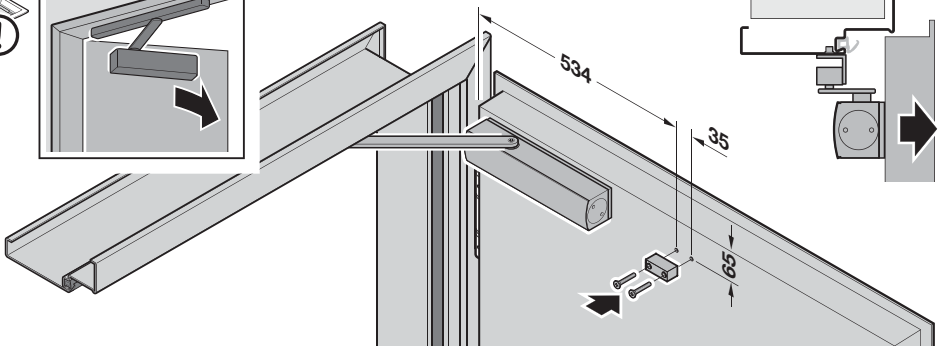
| | X |
|--------------|------|
| GEZE TS 5000 | 1130 |
| DORMA TS 93 | 1179 |



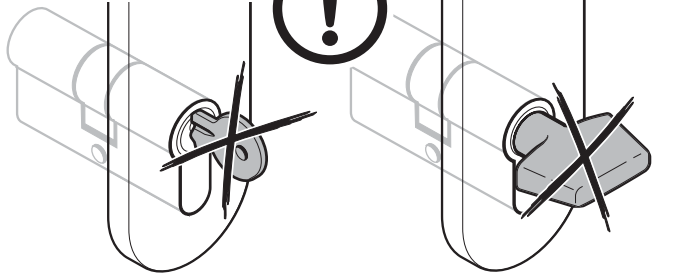
12f



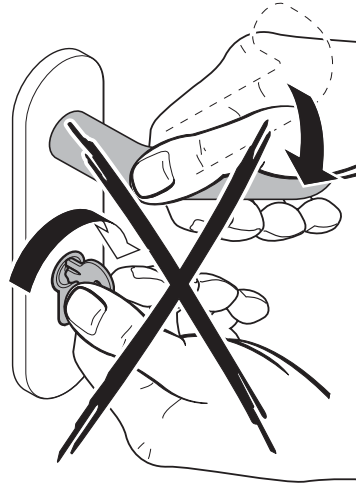
TS 93 GSR BG



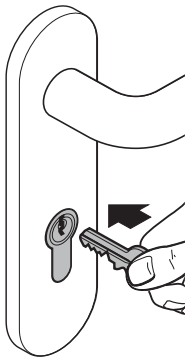
13.1a



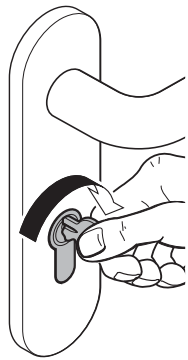
13.1b



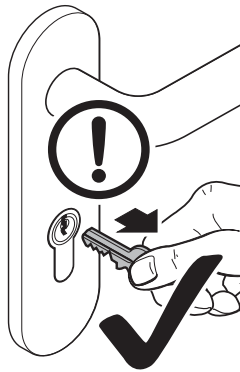
1



2

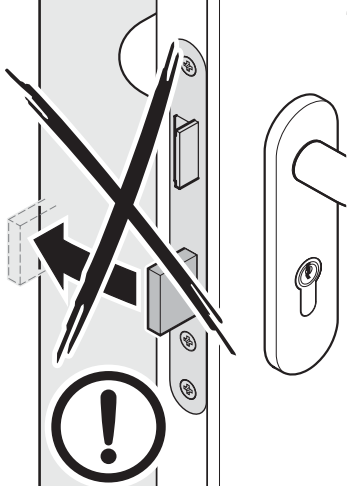


3

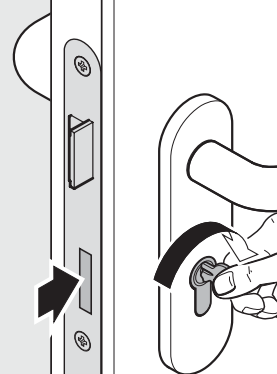


13.2

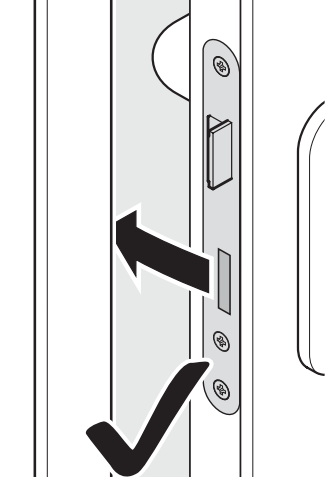
1



2




3



| | | | | | | | |
|-----------------------|--|-----------------------|---|-----------------------|---|-----------------------|---|
| HÖRMANN KG Freisen | RS55-1 P-14-000005-PR01 - ift RS55-2 P-14-000005-PR02-ift | HÖRMANN KG Freisen | T30-1-FSA "H3D" T30-1-RS-FSA "H3D" T30-2-FSA "H3D" T30-2-RS-FSA "H3D" Z-6.20-1974 | HÖRMANN KG Freisen | T30-1-FSA "H3" T30-1-RS-FSA "H3" T30-2-FSA "H3" T30-2-RS-FSA "H3" Z-6.20-1929 | HÖRMANN KG Freisen | T60-1-FSA "H6" T60-1-RS-FSA "H6" T60-2-FSA "H6" T60-2-RS-FSA "H6" Z-6.20-2047 |
| | | MPA BS | | MPA BS | | MPA BS | |

| | | | | | |
|-----------------------|---|-----------------------|---|-----------------------|---|
| HÖRMANN KG Freisen | T90-1-FSA "H16-1" T90-1-RS-FSA "H16-1" T90-2-FSA "H16-2" T90-2-RS-FSA "H16-2" Z-6.20-2010 | HÖRMANN KG Freisen | T90-1-FSA "H16 OD" T90-1-RS-FSA "H16 OD" T90-2-FSA "H16 OD" T90-2-RS-FSA "H16 OD" Z-6.20-2234 | HÖRMANN KG Freisen | T30-1-FSA "H3 OD" T30-1-RS-FSA "H3 OD" T30-2-FSA "H3 OD" T30-2-RS-FSA "H3 OD" Z-6.20-2203 |
| | | MPA BS | | MPA BS | |



Qualitätsmanagementsystem
DIN EN ISO 9001 : 2008

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