DE

Anleitung für Planung, Montage, Betrieb und Wartung

Ein- und zweiflüglige Stahltüren (OD-Türen, H3 G, H3VM, H16 G, HS75, H16 S1)

GS RE / 11.2023

HÖRMANN

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

1 Zu dieser Anleitung

Lesen und befolgen Sie diese Anleitung. Die Anleitung enthält wichtige Informationen zu Einbau, Pflege und Wartung Ihrer Stahltür. Die Anleitung ist ein wichtiges Dokument für die Bauakte.

Falls Sie nach Durchsicht dieser Anleitung noch Fragen haben, kontaktieren Sie den Kundendienst.

Beachten Sie die folgenden Anleitungen für Planung, Montage, Betrieb und Wartung entsprechend Ihrer **Zargenform.**

- **M1.1** Modul Eckzarge
- **M1.2** Modul DryFix, U-Zargen und Blockzargen
- **M1.3** Modul Eck- und Ergänzungszargen, DryFix und Ergänzungszargen

1.1 Verwendete Warnhinweise

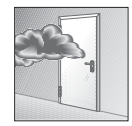
⚠ Das allgemeine Warnsymbol kennzeichnet eine Gefahr, die zu **Verletzungen** oder **zum Tod** führen kann. Im Textteil wird das allgemeine Warnsymbol in Verbindung mit den nachfolgend beschriebenen Warnstufen verwendet. Im Bildteil verweisen zusätzliche Angaben auf die Erläuterungen im Textteil.

⚠ GEFAHR

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

1.2 Verwendete Symbole

Feuerschutz


Rauchschutz

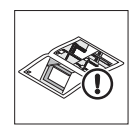
Sicherheitstür

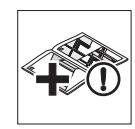
Schallschutz

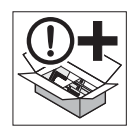
Funktionstür

wichtiger Hinweis

siehe Textteil


siehe Bildteil

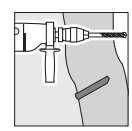

siehe Anleitung für Montage, Betrieb und Wartung im Zubehörpaket

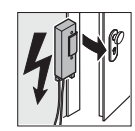

als Zubehör bestellbar

korrektes Vorgehen

unzulässiges Vorgehen (Vorgehensweise)

schweißen


bohren

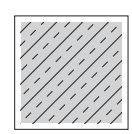

elektrischer Türöffner

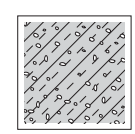
Einbruchgefahr auf Öffnungsseite

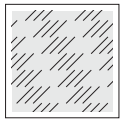
Einbruchgefahr auf Schließseite

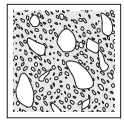
Fluchtweg

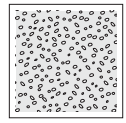
Holz


Mauerwerk, Beton

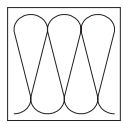

Porenbeton


Gips


Beton


Mörtel

Zargendichtung


Dämmstoff A
(EN 13501-1)

technische
Klarstellung

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.

- Beauftragen Sie nur qualifiziertes und unterwiesenes Personal mit der Montage und Wartung.
- Unterlassen Sie aus Sicherheitsgründen An- und Umbauten.
- Vermeiden Sie Gefahr durch Feuer, Gas, Staub, Dampf, Rauch, Brand und Explosion bei Schweiß, Brenn- und Schleifarbeiten.
- Vermeiden Sie bei Schweißarbeiten, dass aufschäumende Baustoffe durch Wärmeeintrag reagieren und so die Wirkung verlieren.

3 Informationen zu den Türeigenschaften

Die Tür kann einzelne Eigenschaften besitzen, Feuerschutz, Rauchschutz, Schallschutz und Einbruchschutz kombinieren oder eine Funktionstür sein.

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. Beim Einbau in anderen Ländern gelten die jeweiligen nationalen Zulassungen. Die Materialkennwerte müssen mindestens der DIN entsprechen.
- Beachten Sie die DIN 18093 (Einbau von Feuerschutztüren) und die DIN 18100 (Wandöffnungen für Türen) bzw. die länderspezifischen Vorschriften.
- Der Hersteller kann in Einzelfällen eine Übereinstimmungserklärung ausstellen nach § 22 und § 23 der Musterbauordnung.
- **Der Betreiber ist für den einwandfreien Zustand der Tür verantwortlich.**
- In Deutschland dürfen Federbänder an Türen und Klappen mit folgenden Eigenschaften nicht verwendet werden:
  - mit Federbändern
  - Flügelgewicht > 80 kg
  - BRB > 1000 mm
  - mit Verglasung
  - Einbau in Porenbetonwände *
  - Einbau in Montagewände *
  - Kombination als Rauchschutztüren nach DIN 18095 *
  - 2-flüglige Elemente

  * Ausnahme: Maße < 1000 × 1000 mm

  Außerhalb Deutschlands gelten evtl. andere Vorschriften. Der Hersteller empfiehlt das Einhalten der deutschen Vorgaben.
- Verwenden Sie nur zugelassene oder durch den Hersteller freigegebene Bauteile.
- Installieren Sie 3-seitig gefälzte Türen ohne unteren Schachtabschluss in Schächte auf unterstem Bodenniveau.
- Zulässige Wände und Wandstärken: *siehe Tab. 1:*
- Gipskartonwände und Wandstärken: *siehe Tab. 2:*
- Falls in der Einbausituation nicht anders beschrieben, hinterfüllen Sie die Zarge mit mineralischem Mörtel auf Zementbasis, z. B. LM21 von Sakret. Bei T30 / $EI_2$30 müssen Sie den Zargenspiegel nicht zwingend mit Mörtel auffüllen. Um das Verbiegen durch den Druck des Mörtels zu vermeiden, spreizen Sie U-Zargen und Eckzargen (mit und ohne Gegenzargen) vor dem Hinterfüllen.
- Verwenden Sie bei Feuerschutz einen Türdrücker mit Fallverdeck oder einen Schließzylinder und bei Rauchschutz einen Schließzylinder.
- Unter dem geschlossenen Feuerschutzabschluss muss der Boden nichtbrennbar sein.
- **Rauchschutz:**
  - **RS 65-1:** AbP Nr. P-14-001829-PR01-ift
  - **RS 65-2:** AbP Nr. P-14-001829-PR02-ift
  - Verwenden Sie Dichtungskeile (siehe Bildteil Punkt 3.5) und Bodendichtungen (siehe Bildteil Punkt 4).
  - Wenn Sie die Zarge nicht komplett mit Mörtel hinterfüllen, müssen Sie den Zargenanschluss an die angrenzenden Bauteile versiegeln. Versiegeln Sie beide Seiten und den Fußbereich lückenlos mit dauerelastischem Material.
- Setzen Sie Verglasungen von Feuerschutztüren keiner direkten Sonnenstrahlung aus.
- Um die volle Funktion der Bodendichtung zu gewährleisten, muss der Boden eben, glatt und fugenlos sein.

Tab. 1: Zulässige Wände und Mindestwanddicken für Feuerschutz- und Rauchschutztüren (mm) siehe 4.2

Stahltür / Wand	H3-1 OD H_30-1 OD		H3-2 OD H_30-2 OD		H3-1 G H_30 D1	H3-2 VM H_30 D2	H6-1 OD		H6-2 OD	H16-1 G H_90 D1	H16-2 G H_90 F-2	H16-S1 H_90 E-1	H16-1 OD H_90-1 OD		H16-2 OD H_90-2 OD
Beton DIN 104-1, Festigkeit ≥ C12 / 15	1) k ≤ 2500	2) k > 2500	1) k ≤ 2500	2) k > 2500									e ≤ 1320		
	100	140	100	140	140	140	140		140	140		120	140		140
Mauerwerk DIN 1053-1, Steinfestigkeit ≥ 12, Mörtelgruppe ≥ 2	1) k ≤ 2500	k > 2500	1) k ≤ 2500	2) k > 2500			e ≤ 1250 und k ≤ 1750	e ≤ 1500 und k ≤ 2500					e ≤ 1250 k ≤ 2500	e ≤ 1500 k ≤ 2500	
	115	175	115	175	175	175	115	175	175	240		175	115	6) 175	175
Porenbetonblock oder Plansteine, DIN 4165-3, Festigkeitsklasse ≥ 4, Porenbetonplatten nach allgemeiner bauaufsichtlicher Zulassung, Festigkeitsklasse ≥ 4.4	k ≤ 2500		k ≤ 2500				e ≤ 1320		e ≤ 2500				e ≤ 1320 k ≤ 2500		e ≤ 2500 k ≤ 2500
	150		150		175	175	150		200	150		175	150		200
Montagewand F90-A nach AbP, **Bild 1.12** beachten, Höhe ≤ 5000 mm	3)		3)		3)	3)									
Montagewand F90-A DIN 4102-4 / Tab. 10.2, **Bild 1.12** beachten, Höhe ≤ 5000 mm	e ≤ 1320		e ≤ 2500			e ≤ 2750 und k ≤ 2750	e ≤ 1250		e ≤ 2500				e ≤ 1320 k ≤ 2500		e ≤ 2500 k ≤ 2500
	100		100		100	100	100		125			125	100		150
Montagewand F30-A **Bild 2D / 2.3** beachten, Höhe ≤ 5000 mm	e ≤ 1250		e ≤ 2500												
	100		100												
Montagewand F90-B DIN 4102-4 / Tab. 10.3, Höhe ≤ 5000 mm	e ≤ 1250 und k ≤ 2500		e ≤ 2500 und k ≤ 2500												
	4) 125 / 5) 130		4) 125 / 5) 130												
Montagewand F30-B AbP Nr.: P – SAC-02 / III-668	e ≤ 1125 und k ≤ 2125														
	185														
Gips-Wandbauplatten VG Orth, P – SAC 02 / III-468, **Bild 2C / Typ3** beachten	e ≤ 1250 und k ≤ 2500														
	100														

Mindestwanddicken **1)** ohne Oberteil **2)** mit Oberteil **3)** siehe Tab. 1: **4)** 2-schalige Zarge **5)** DryFix **6)** Rauchschutz, e ≤ 1320

Tab. 1: Zulässige F90-A Montagewände mit Mindestwanddicken für Feuerschutz- und Rauchschutztüren, Höhe ≤ 5000 mm

Prüfzeugnis-Nr.	Wand	H3 OD H_30 OD	H3-1G H_30 D1	[1] H3-2 VM H_30 D2
P-3310/563/07-MPA BS	**Knauf** W 111 – W 118, W 132	≥ 100 mm	—	—
P-3310/563/07-MPA BS	**Knauf** W 112	≥ 100 mm	≥ 100 mm	≥ 100 mm
P-3391/170/08-MPA BS	**Knauf** W 131	≥ 116 mm	≥ 116 mm	≥ 116 mm
P-3202/2028-MPA BS	**Knauf** W 352, W 353	≥ 100 mm	≥ 100 mm	≥ 100 mm
P-3056/312/11-MPA BS	**Knauf** W 135	≥ 100 mm	—	—
P-3956/1013-MPA BS	**Saint-Gobain Rigips** MW 12 RF, MW 12 RFI, MW 12 HA, MW 12 DH, MW 12 BF, MW 12 RFWF, MW 12 GX, 3.40.01ff., 3.41.01ff.	≥ 100 mm	≥ 100 mm	≥ 100 mm
P-3014/1393-MPA BS	**Saint-Gobain Rigips** MW 11 D	≥ 100 mm	≥ 100 mm	≥ 100 mm
P-3014/1393-MPA BS	**Saint-Gobain Rigips** 3.60.20	≥ 100 mm	≥ 100 mm	≥ 100 mm
P-3020/0109-MPA BS	**Saint-Gobain Rigips** BW 13 DDRF	≥ 165 mm	—	—
P-3020/0109-MPA BS	**Saint-Gobain Rigips** 6.70.10	≥ 165 mm	≥ 165 mm	≥ 165 mm
P-3020/0109-MPA BS	**Saint-Gobain Rigips** 3.70.10	≥ 100 mm		
P-SAC 02/III-682	**Saint-Gobain Rigips** MW 11-MW 23	≥ 100 mm		
P-SAC-02/III-681	**Etex / Siniat** SW 11 – SW 14	≥ 100 mm	≥ 100 mm	≥ 100 mm
P-SAC-02/III-681	**Etex / Siniat** SW 11 – 14 / SW 11 – 44, SW 11 – 14 / SW H11 – 44	≥ 100 mm	—	—
P-2101/028/18-MPA BS	**Etex / Siniat** SW 18	≥ 100 mm	—	—
P-19-001876-PR02	**Etex / Siniat** SW 12-FA 50	≥ 100 mm	—	—
P-2100/100/17-MPA BS	**Etex / Promat** 450.81	≥ 100 mm	—	—
P-3757/7578-MPA BS	**Etex / Promat** 450.93	≥ 100 mm	—	—
P-3240/130/14-MPA BS	**Etex / Promat** 450.91/92	≥ 100 mm	—	—
P-11-003478-PR02	**B + M** W50 / 75, SW100 / 125oW, W50 / 100-SW100 / 150	≥ 100 mm	—	—
Z-19.32-2163	**Fermacell / James Hardie Europe** 1S31 / 3.1	≥ 100 mm	≥ 100 mm	≥ 100 mm
P-3249/1399-MPA BS	**Fermacell / James Hardie Europe** 1S23 AE	≥ 100 mm	—	—
P-SAC 02/III-512	**Fermacell / James Hardie Europe** 1S32 A1, 1S32 A1 / 1S34 H_2O	≥ 100 mm	—	—
P-3025/3165-MPA BS	**Fermacell / James Hardie Europe** 1S31 H_2O / 1S32 H_2O / 1S33 H_2O	≥ 100 mm	—	—
Z-19.32-2147	**Danogips** W30-02, W30-27, W30-41, W30-51, W30-61	≥ 100 mm	—	—
Z-19.32-2151	**Danogips** W60-02, W60-41, W60-51	≥ 100 mm	—	—
Z-19.32-2152	**Danogips** W60-05, W60-53, W60-63, W90-02, W90-41, W90-51, W90-62	≥ 100 mm	—	—

1) max. 2750 × 2750 mm

3.2 Schallschutztüren

- Die gesamte Schalldämmung ist von den umgebenden Bauteilen abhängig. Die aus Wand und Tür resultierende Schalldämmung können Sie nicht allein ableiten aus dem bewerteten Laborwert der Tür. Sie müssen diese Schalldämmung gesondert nachweisen.
- Achten Sie auf vollständig anliegende Dichtung(en).
- Um die vollständige Dichtfunktion der Bodendichtung zu gewährleisten, muss der Boden glatt sein.
- Trennen Sie den Estrich im Schwellenbereich.
- Wenn Sie keine Rauchschutzkeile, siehe Bildteil Punkt 3.5 und Punkt 4, verwenden, müssen Sie mit folgenden Korrekturen der Schalldämm-Maße rechnen:

bewerteter Laborwert der betriebsfertigen Tür mit Eckformstücken	Korrektur für Ausführung mit durchlaufender Zargenfalzdichtung in dB
≤ 39 dB	**0**
39 bis 44 dB	**–1**
45 dB	**–2**

- Verwenden Sie einen Schließzylinder.
- Hinterfüllen Sie die Zarge vollständig mit Mörtel.
- Verkleben Sie die auf Gehrung geschnittenen Ecken der Zargendichtung z. B. mit Köratan UC 41.
- Bei einem Schalldämm-Maß > 50 dB müssen Sie die Zarge mit Mörtel ausfüllen. Bei einem Schalldämm-Maß ≤ 50 dB können Sie die folgenden Zargenhinterfüllungen ohne Abzug der Schalldämm-Maße verwenden. Voraussetzung dafür ist, dass alle Zwischenräume zwischen Zarge und Wand sowie zwischen Bändern und Zarge dauerhaft verschlossen sind.

Zargenvarianten
Universal-Eckzarge, U-Zarge, DryFix mit Mineralwolle
Universal-Eckzarge, U-Zarge, DryFix mit Gipskarton
Universal-Eckzarge, U-Zarge, DryFix ohne Hinterfüllung
Universal-Eckzarge, U-Zarge, DryFix ausgemörtelt
Blockzarge mit Mineralwolle

3.3 Einbruchschutztüren

- Nur wenn der Riegel komplett vorgeschlossen und der Schlüssel abgezogen ist erfüllt die Tür die beschriebenen Einbrucheigenschaften.
- Sichern Sie die Türblätter aller RC3- und RC4-Türen an den Bändern mit je 2 Schrauben (siehe Bildteil Punkt 3.3.
- Verwenden Sie bei RC3-Sicherheitsausstattung (ausgenommen Einbausituation H1) ausschließlich:
  - Eckzargen, Eckzargen mit Gegenzargen
  - U-Zargen, Blockzargen
- Verwenden Sie bei RC4-Sicherheitsausstattung ausschließlich:

- Eckzargen, Eckzargen mit Gegenzargen
- U-Zargen

- Hinterfüttern Sie die Zarge bei RC2-Sicherheitsausstattung mindestens im Bereich der Verriegelungspunkte, Bänder, Sicherungsbolzen und Falzluftbegrenzer dauerhaft druckfest. Druckfestigkeit ca. 10 N / mm².
- Hinterfüllen Sie die Zarge bei RC3-Sicherheitsausstattung und RC4-Sicherheitsausstattung umlaufend druckfest. Druckfestigkeit ca. 10 N / mm².
- Stützen Sie die Zarge und bei RC3-Sicherheitsausstattung umlaufend mit druckfestem Material. Stützen Sie die Zarge bei RC2-Sicherheitsausstattung mindestens im Bereich der Verriegelungspunkte, Bänder, Sicherungsbolzen und Falzluftbegrenzer dauerhaft mit druckfestem Material. Beachten Sie die folgende Tabelle.

Material zur Zargenabstützung	RC2	RC3	Brand-schutz
Beton	ja	ja	ja
Mörtel (M10 nach DIN V 20000-412)	ja	ja	ja
Nadel- oder Laubholz (C oder D nach EN 338)	ja	ja	nein
Promaboard, Firma Promat	ja	nein	ja
Promatect H, Firma Promat	ja	ja	ja
ROKU V2, Firma Rolf Kuhn	ja	ja	ja
Stahlblech	ja	nein	ja

- Montieren Sie an Türen mit Gläsern den Glashalterahmen mit Sicherungslaschen oder Sicherungswinkeln auf der Angriffsseite.
- Verwenden Sie bei 2-flügligen Türen die mitgelieferte Bodenbuchse.
- Messen Sie bei 2-flügligen Türen die unteren Spaltmaße von der Bodenbuchse.
- Verwenden Sie bei Antipaniktüren mit Türdrücker oder Stangengriff unseren L-Winkel mit Höckerschwelle, siehe 3.15.
- Stellen Sie sicher, dass sichtbare Zargenbefestigungspunkte und Hinterfütterungsteile von der Angriffsseite aus nicht demontierbar sind. Sorgen Sie dafür, dass sichtbare Schraubenantriebe nach der Zargenmontage unbrauchbar oder dauerhaft verdeckt sind.

3.3.1 Mindestanforderungen an einbruchhemmende Türen

Widerstandsklasse nach DIN EN 1627	RC2	RC3	RC4
Mauerwerk DIN 1053, Teil 1 [mm] Steinfestigkeit ≥ 12	115	115	240
Stahlbeton ≥ C12 / 15 [mm]	100	120	140
Porenbetonsteine Klasse 4 [mm]	175, 115 [1]	240	–
Porenbetonplatten Klasse 4 [mm]	150	–	–
Montagewand Knopf W118.de, RC2 [mm]	101	✓	–
Holz-Ständerwand nach DIN EN 1627	✓	✓	–
Schließzylinder nach DIN 18252:2006-12 [2] [3]	21-, 31-, 71-BZ		42-, 82-BZ
Schutzbeschlag nach DIN 18257:2022-02 [2]	ES1 (ZA)	ES2 (ZA)	ES3 (ZA)
Gläser EN 356 (Feuerschutz)	P5A [4] P7B [5]	P5A [4]	–

1) nur 1-Flügler, wir empfehlen Wandstärken ab 150 mm
2) Schutzbeschlag oder Schließzylinder muss mit Ziehschutz (ZA) ausgeführt sein.
3) nicht zwingend im Lieferumfang enthalten
4) nicht in Flucht- und Rettungswegen
5) in Flucht- und Rettungswegen

3.4 Funktionstüren

Sie müssen die Zargen nicht hinterfüllen.

3.5 Außenanwendung

Beachten Sie die Anleitung Art.-Nr.: 505 420 beim Einbau im Außenbereich.

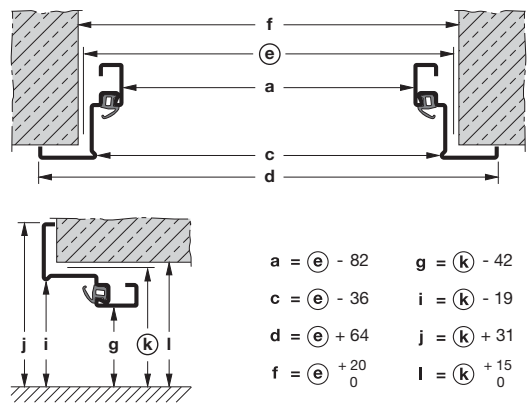
4 Montage

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?
- Müssen Sie Bauvorschriften beachten?
- Müssen Sie die Wand im Bereich der Mauerschutzkästen ausstemmen?

4.2 Maße nach EN 12519



a = e - 82
g = k - 42
c = e - 36
i = k - 19
d = e + 64
j = k + 31
f = e +20 0
l = k +15 0

Abb. 1: Maße

a / g lichte Öffnungsbreite / -höhe
c / i lichte Falzbreite / -höhe
d / j Zargenaußenmaß-Breite / Höhe
e / k Baurichtmaß-Breite / -höhe
f / l lichte Rohbaumaß-Breite / Höhe (DIN 18100)

4.3 Bei der Montage

- Beachten Sie die Einbauhinweise in den Zubehörpaketen.
- Verwenden Sie mitgeliefert Montageteile, z. B. Dübellaschen, Dübel oder Schrauben.
- Verwenden Sie im Punkt 2 die angegebenen Dübel.
- Verwenden Sie in Verbindung mit Eckzarge und Hochlochziegel bzw. Gipssteinen den Dübel FUR 10 × 80 / 100 mm. Beachten Sie Punkt 2 der Anleitung für Montage, Betrieb und Wartung.
- Bohren Sie Hochlochziegel und Hohlkammersteine ohne Schlag.
- Beachten Sie den Mindestrandabstand von 50 mm bei horizontalen bzw. vertikalen Bohrungen. Beachten Sie die Spreizrichtung der Dübel.
- Entfernen Sie bei Zargen ohne Bodeneinstand den unteren Montagewinkel vor der Montage.
- Türblattkürzungen sind nicht möglich.

4.4 Hinweise zum Bildteil

siehe Punkt	Beschreibung
1 a	Dünnfalz
1 b	Dickfalz
1.2 a / 1.2 b	Anzahl Befestigungspunkte
1.2 c	Einbauablauf
1.3 a	Ausbau der Standardtür
1.3 b	Ausbau der Sicherheitstür
1.4	Zusammenbau der Eckzarge
1.5	Bodenmulde und Montagewinkel
1.6	Befestigungsteile
1.7	Minimaler Randabstand und Spreizrichtung Dübel
1.8	Einbau Schattennutprofile
1.9	Leerrohre in der Zarge
1.10	Einsetzbare E – Öffner
1.11	Mauerschutzkästen in GKF – Wände
1.12	Aufbau GKF-Wände
2.0	Einbausituationen und Zargenformen
3.1 a	Einbau mit Standardbändern
3.1 b	Einbau mit 3D-Bändern
3.2	Einstellen der Luftspalte
3.3	Einbau der Sicherheitstür
3.4	Entfernen der Bodenwinkel bei Zargen ohne Bodeneinstand
3.5	Dichtungskeile mit Silikon befestigen
3.6	Einbau der Zargendichtung
3.7	Anheben der Tür
3.8	Spannen des Federbands Umbau Glashalterahmen
3.9	Prüfung Falleneingriff
3.10	Umbau des Lüftungsgitters
3.11	Umbau Glashalterahmen
3.12	Dämmschichtbildner bei Feuer- und Rauchschutz
3.13	Dämmschichtbildner an Sicherungsbolzen
3.14	Kennzeichnung großer Glasflächen
3.15	Paniktüren und RC
3.16	Einbau Blockschloss bei Mehrfachverriegelung
3.17	Einbau Ankerplatte für Türhaftmagnet
4	Bodendichtungen
5	Türschließer
6	Bohrungen für Montage Sensoren Drehflügeltür-Antriebe
7 a	Schlüssel bei Paniktüren abziehen
7 b	Fehlbedienung des Schlosses vermeiden

5 Wartung und Pflege

5.1 Jährliche Wartungsarbeiten

- ▶ Kontrollieren Sie Türblatt, Zarge und alle Anbauteile wie Türdrücker, Schloss, Türschließer und Bänder auf Funktion und korrosive Schäden.
- ▶ Fetten Sie Falle, Bandbolzen und Lagerringe mit Mehrzweckfett.
- ▶ Schmieren Sie Bolzenschlösser mit Teflonspray.
- ▶ Kontrollieren Sie die Spaltmaße.
- ▶ Kontrollieren Sie die Spaltmaße und die Bauanschlussfugen.
- ▶ Achten Sie auf die Sichtbarkeit der Kennzeichnung.
- ▶ Tauschen Sie defekte Teile aus und verwenden Sie nur Original Ersatzteile des Herstellers.

⚠ GEFAHR

Lebensgefahr durch abgelöste Dämmschichtbildner

Durch abgelöste Dämmschichtbildner verliert der Feuerschutzabschluss seine Funktion.

- ▶ Ersetzen Sie abgelöste Dämmschichtbildner, siehe Bildteil Punkt 3.12.

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

5.2 Inbetriebnahme und Wartung von Panikverschlüssen

www.hoermann-docs.com/271802

5.3 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 alle zu lackierenden Oberflächen an, außer die Dämmschichtbildner.
3. Reinigen Sie die Oberflächen gründlich.
4. Kleben Sie das Kennzeichnungsschild ab.
5. Verwenden Sie für die Grund- und Endbeschichtung geeignete Lacke, die vom Lackhersteller für pulverlackierte Untergründe freigegeben sind. Beachten Sie das BFS-Merkblatt Nr. 24 sowie die Verarbeitungshinweise der Lackhersteller. Fertigen Sie eine Haftprobe an. Um Korrosionsschäden zu vermeiden, nehmen Sie die Endbehandlung innerhalb von 3 Monaten nach Montage vor.
   Witterungseinflüsse wie z. B. Sonneneinstrahlung können zu vorübergehender Verformung des Türblatts führen. Dunkle Anstriche verstärken diesen Effekt, der keinen Grund zur Beanstandung darstellt. Wir empfehlen helle und bzw. oder reflektierende Anstriche.
6. Bringen Sie die Dichtung(en) nach dem Trocknen der Farbe wieder an.

5.4 Reinigung

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

5.5 Pflege von Edelstahl-Bauteilen

- ▶ Reinigen und pflegen Sie Bauteile aus Edelstahl regelmäßig. Verwenden Sie Edelstahlpflege Edel Glanz von Hörmann und ein weiches Tuch.

6 Etikettierung und Kennzeichnung

Das Etikett der **Türtypen D65-1, D65-2, D65-1 OD, D65-2 OD** 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 finden Sie im Falzbereich der Tür auf dem Etikett zwischen dem Herstellerlogo und dem CE-Konformitätskennzeichen.

Wenn das CE-Konformitätskennzeichen auf dem Etikett fehlt, fallen diese Türen nicht unter die oben genannte, harmonisierte europäische Produktnorm. Diese Türen dürfen daher nicht über eine CE-Kennzeichnung bzw. Leistungserklärung verfügen.

7 Allgemeines

Erst nach vorschriftsmäßiger Montage und ordnungsgemäßer Funktionsprüfung dürfen Sie die Tür in Betrieb nehmen. Durch eine Veränderung des Produkts ist die Leistungserklärung ungültig.

8 Demontage und Entsorgung

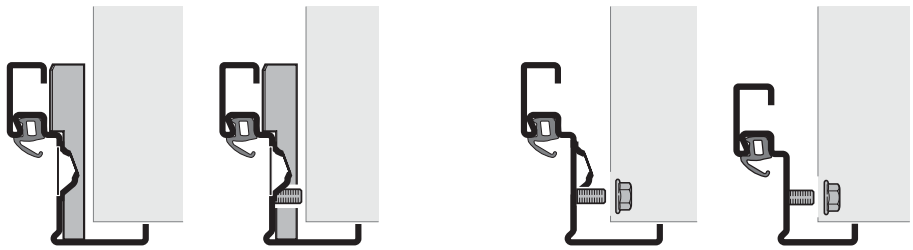
Die Demontage erfolgt analog der Montage in umgekehrter Reihenfolge. Entsorgen Sie das Bauelement nach den örtlichen Vorgaben.

9 Leistungserklärung

Leistungserklärung siehe Bild **1.3**:
www.hoermann.com/dop

M1.1

480810



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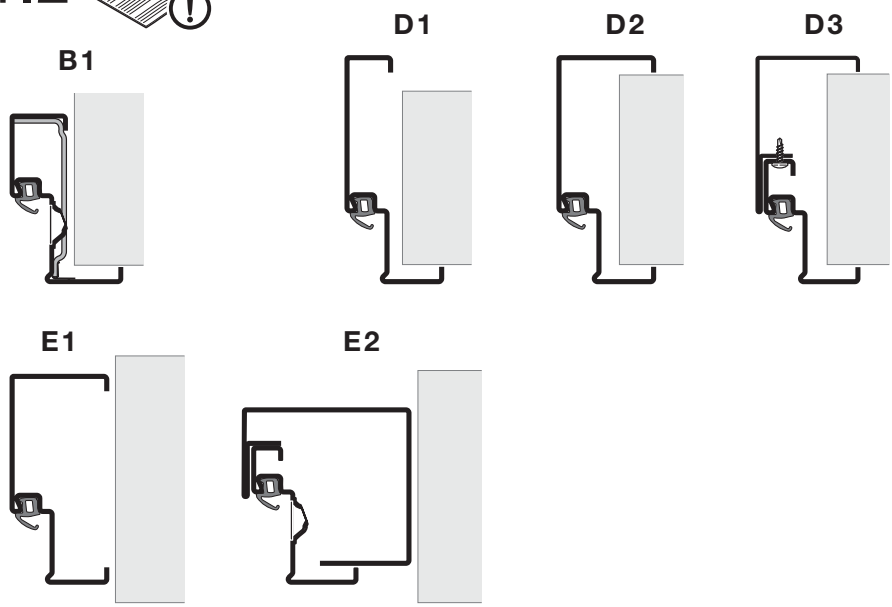

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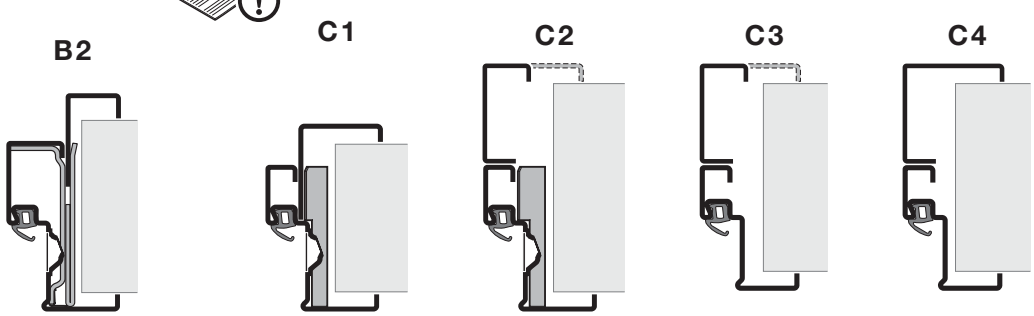

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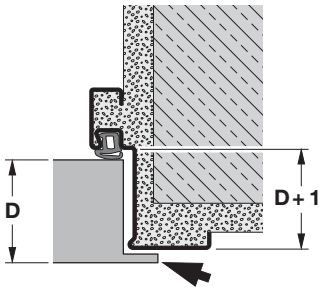

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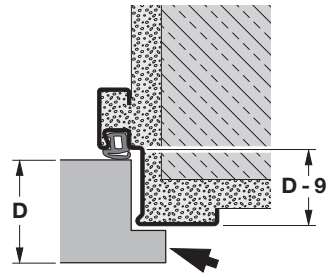
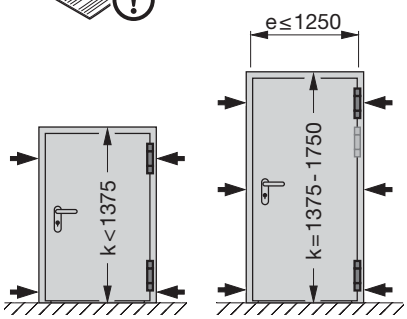
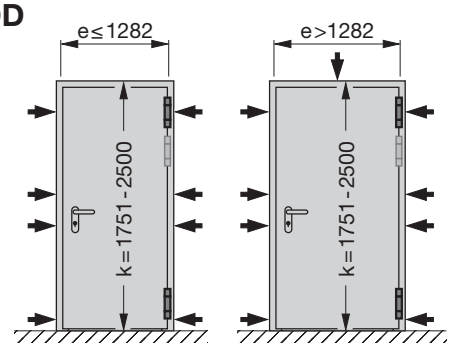


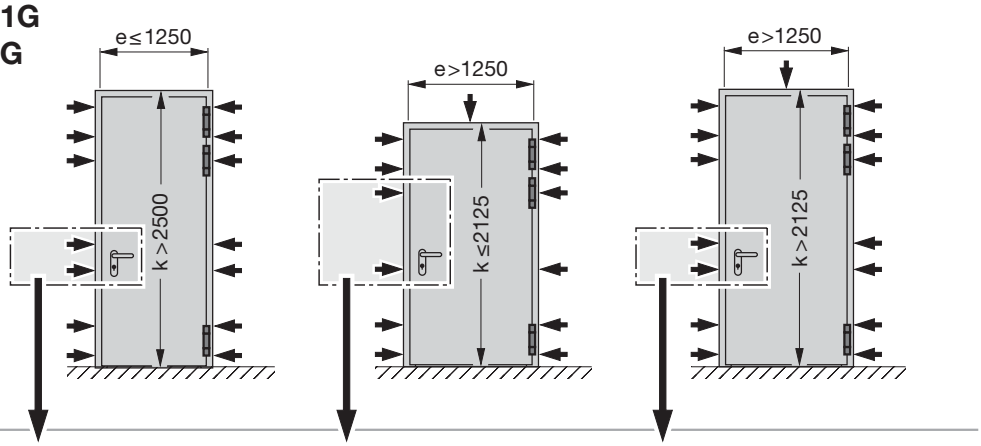
1.2a 4.2/4.3



H16-S1
H16-1 OD
HS75



H16-1G
H3-1G



T90-1 / EI_2 90-1

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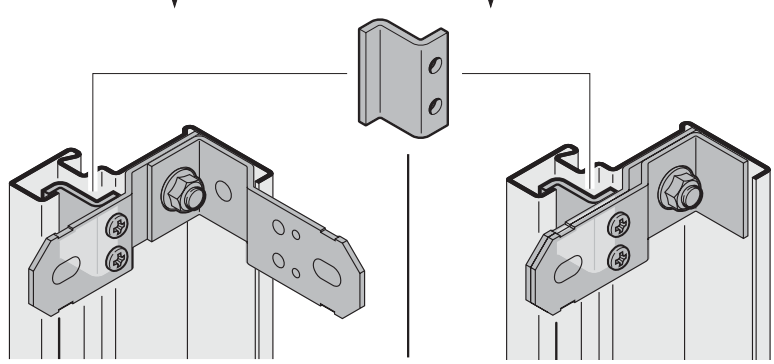
1.6b



1.2b 4.2/4.3

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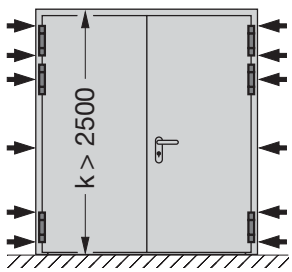
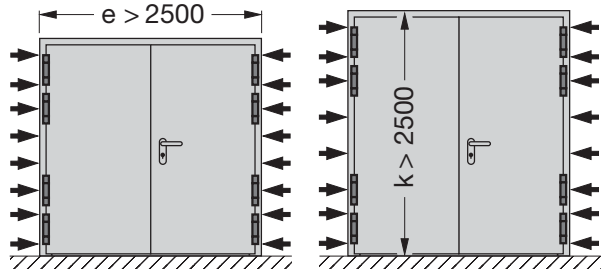
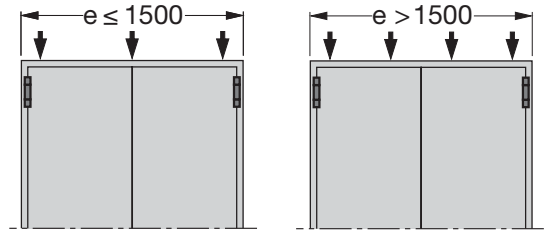
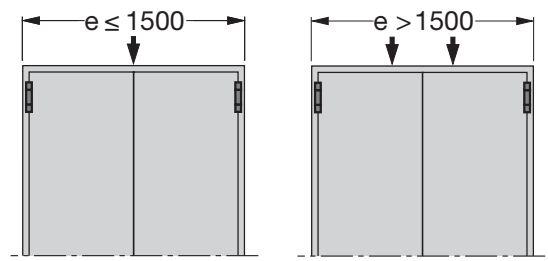
D65-2 VM

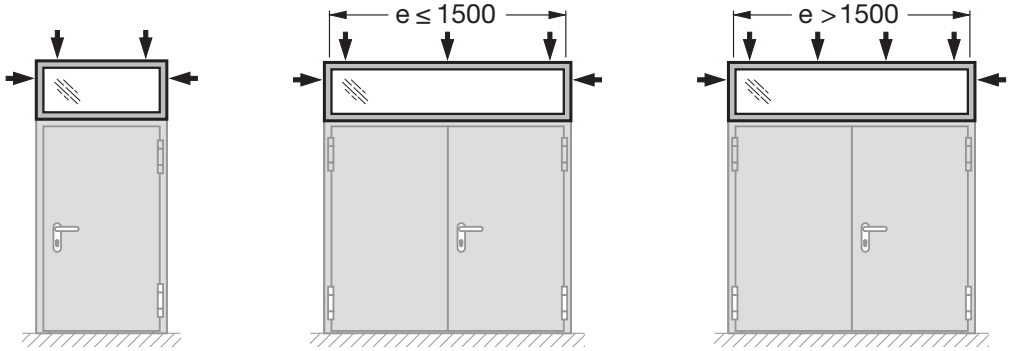


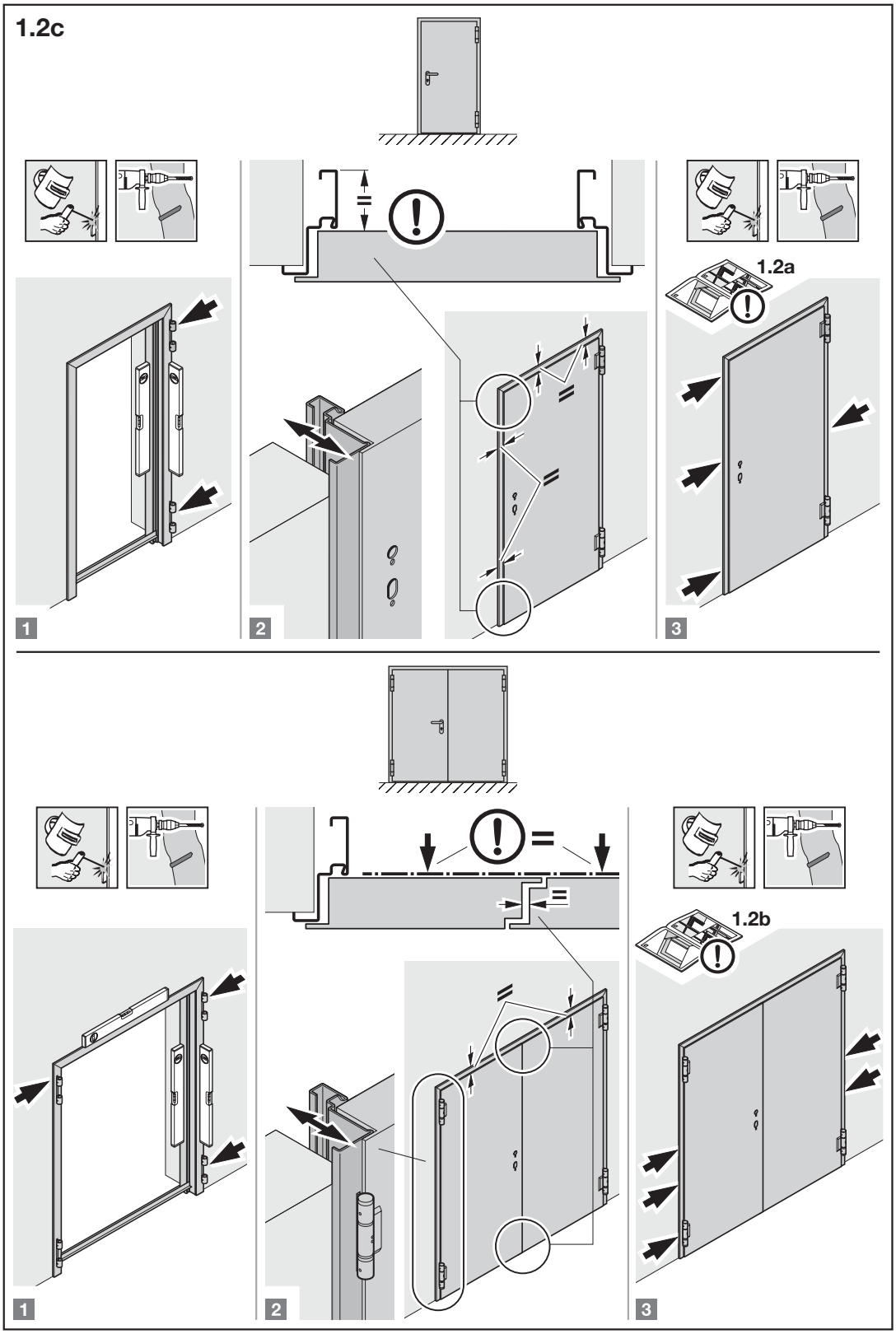
H16-2 G
H_90 F2







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1.2b
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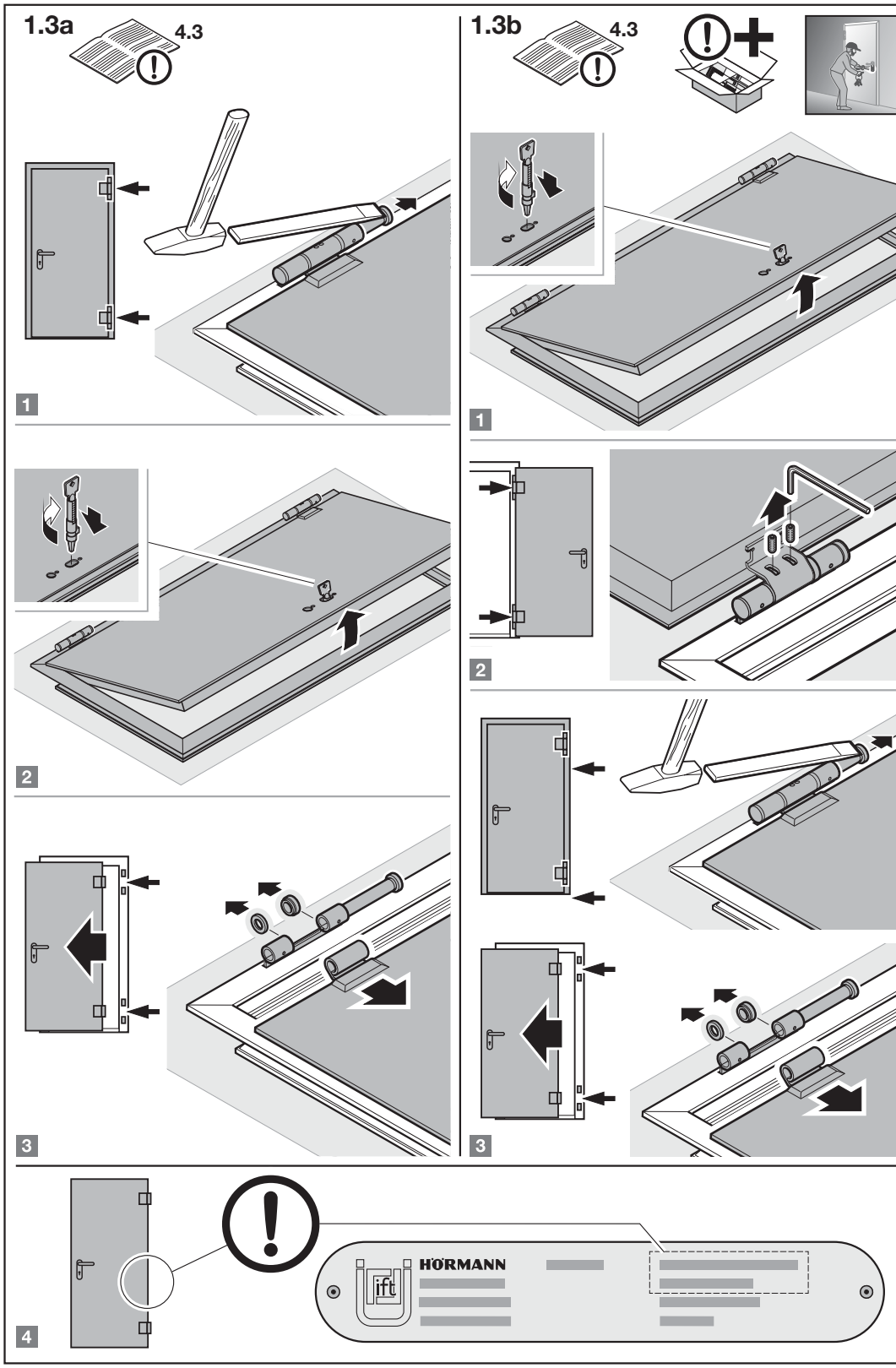
2
3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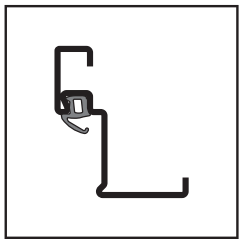
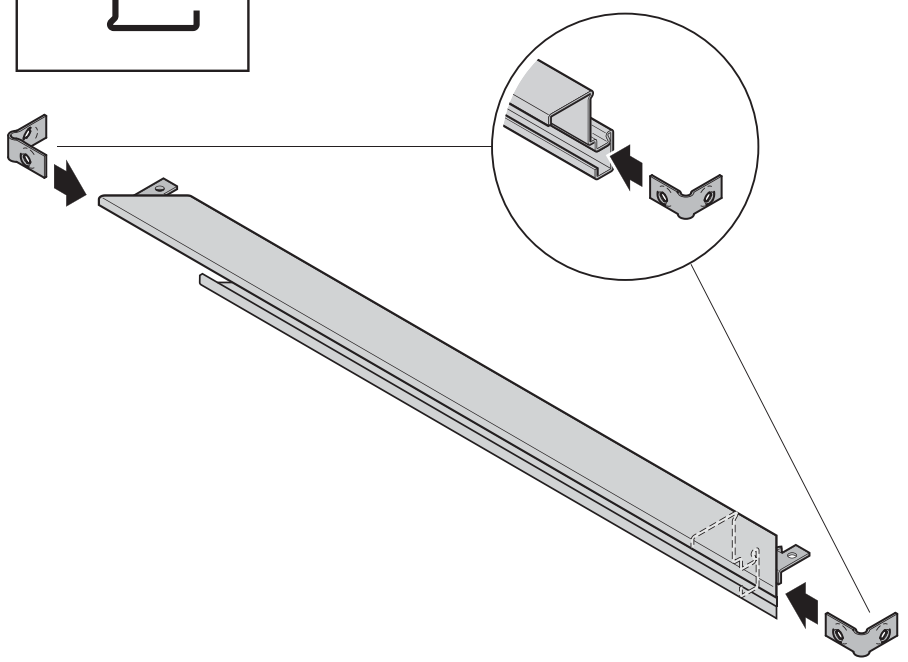
1.4





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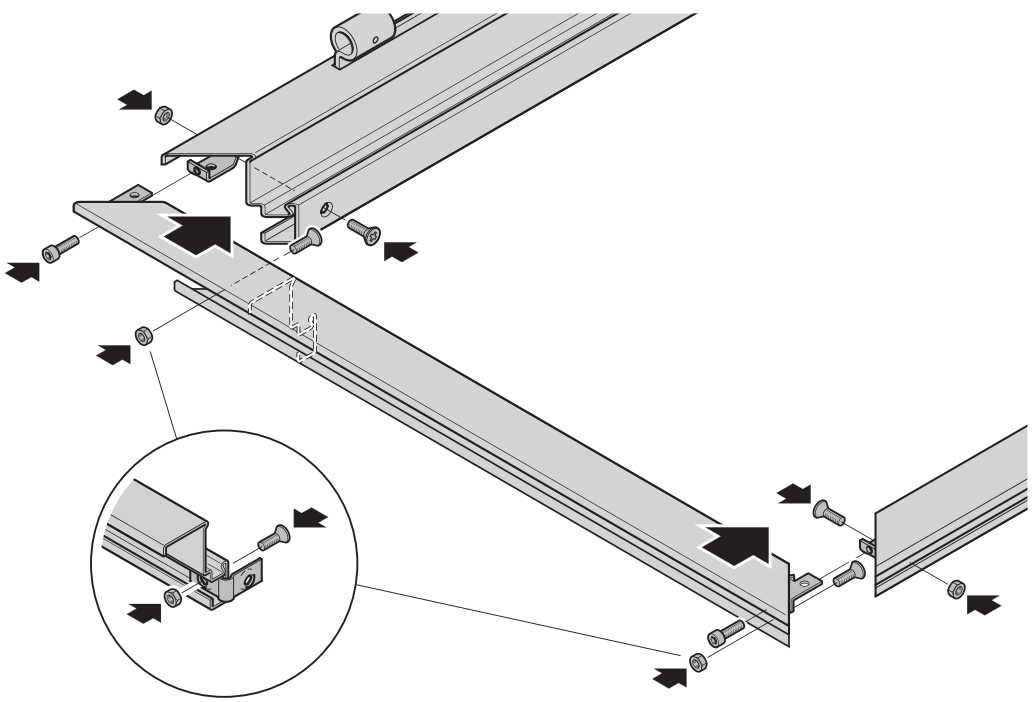

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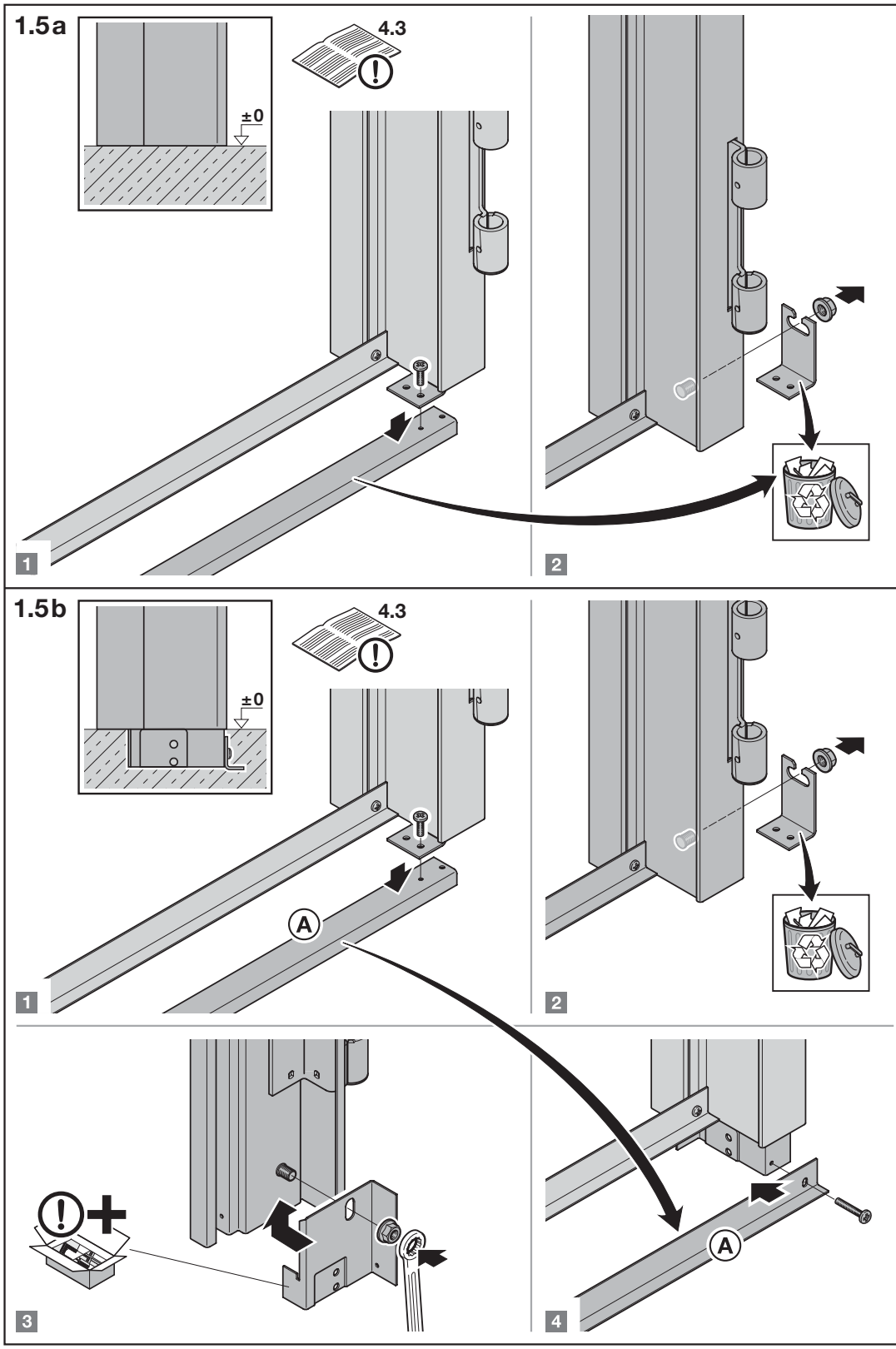
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A
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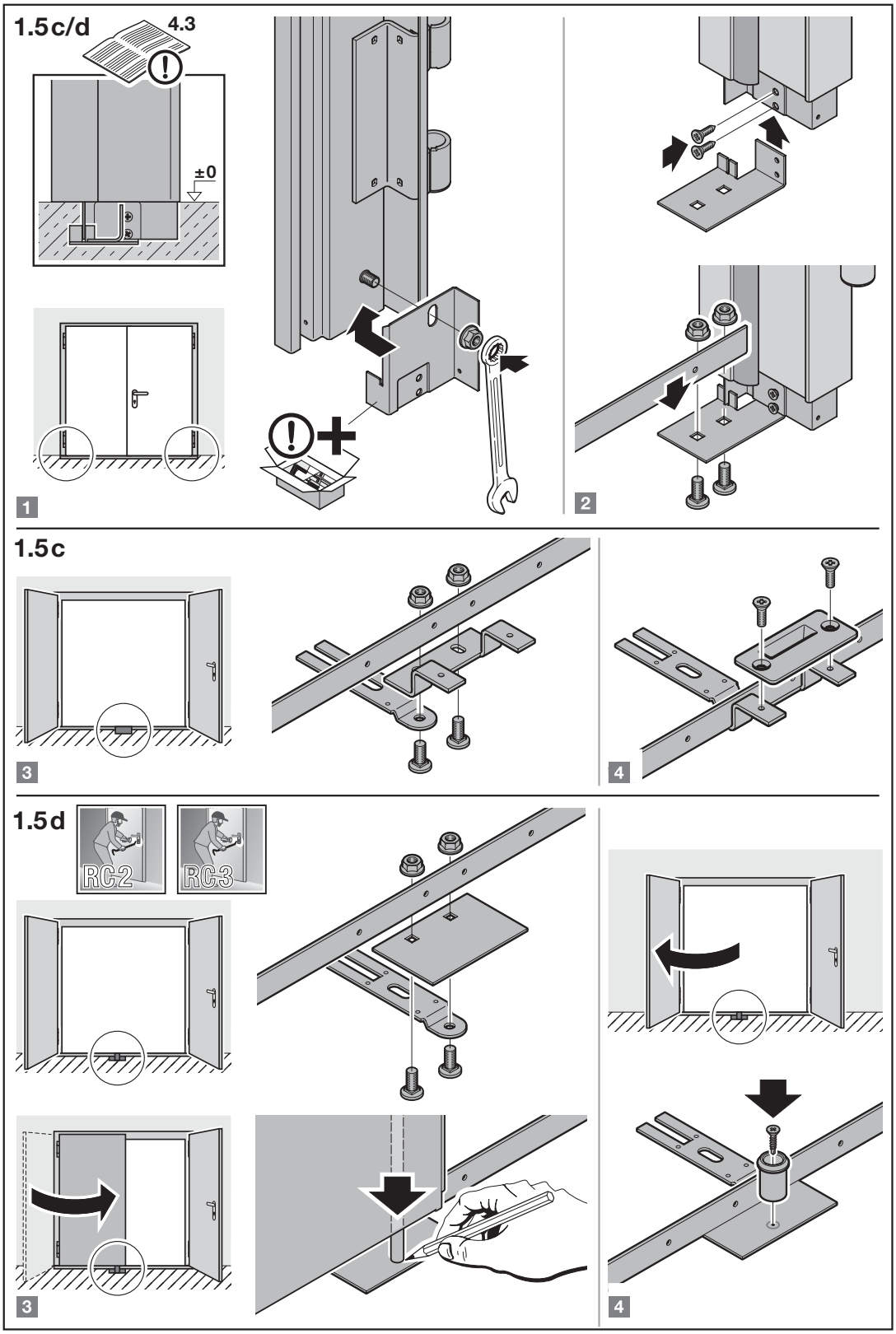
A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RC3
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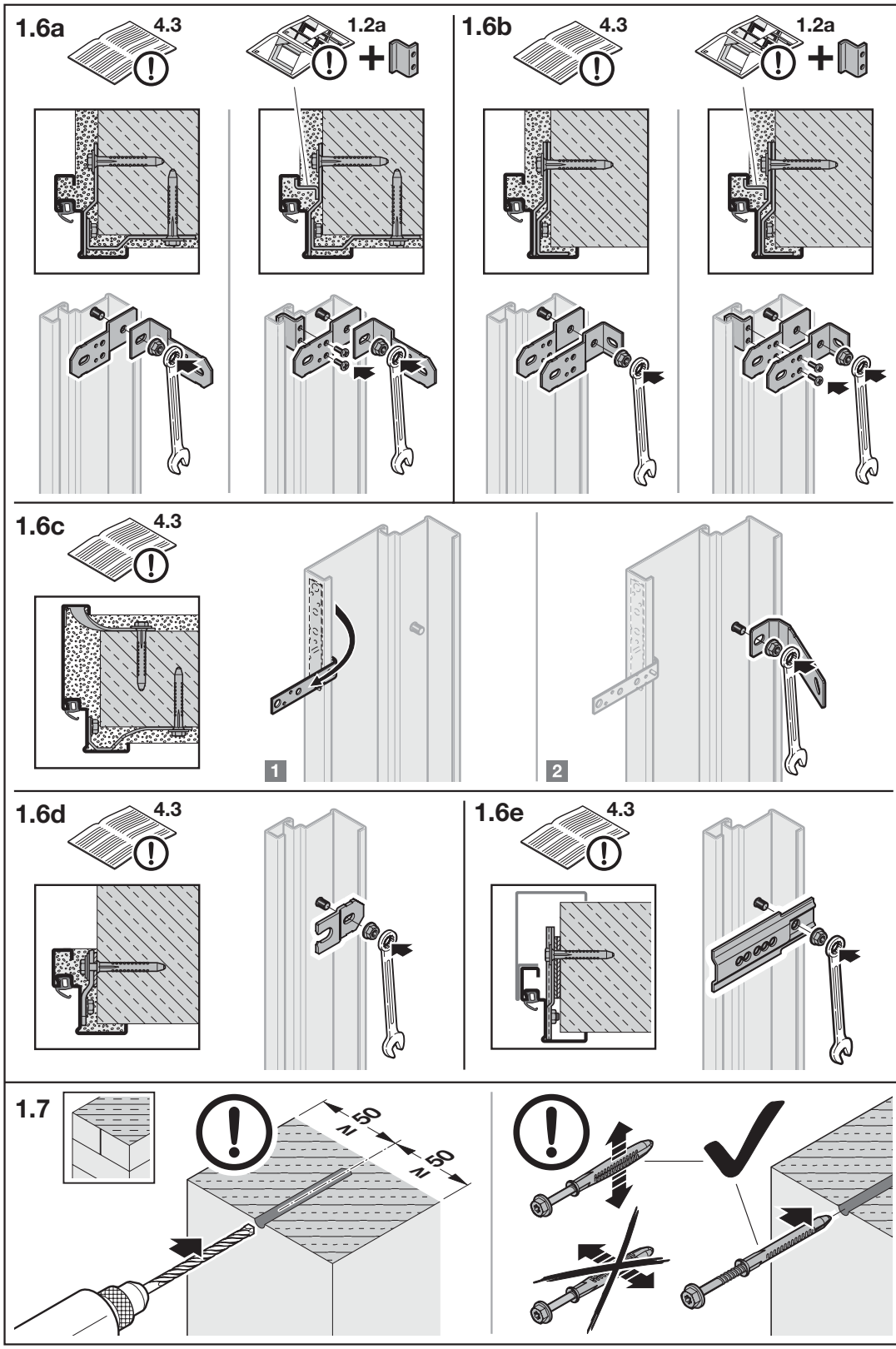
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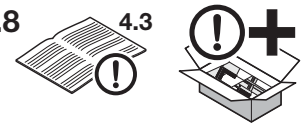
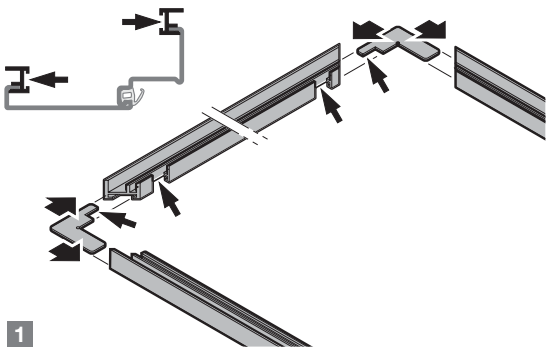
50 N

1.8





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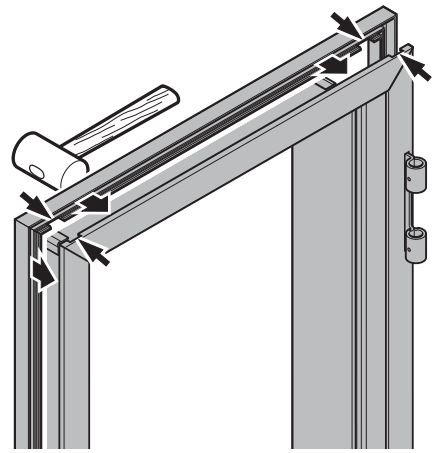

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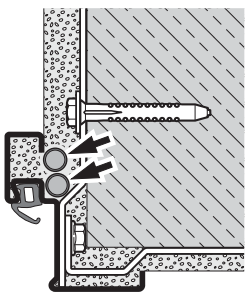

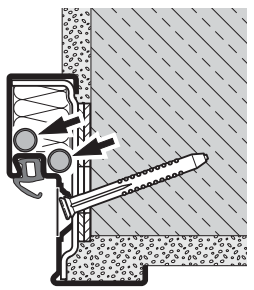

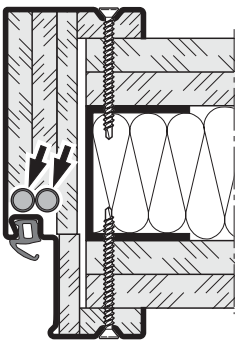

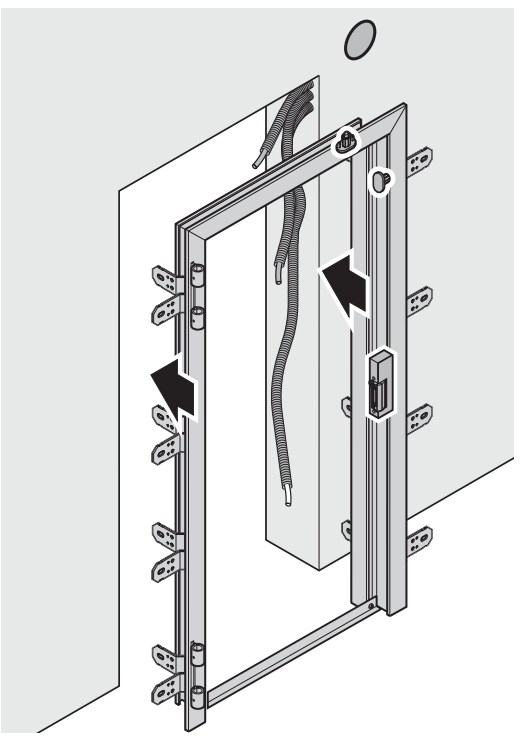

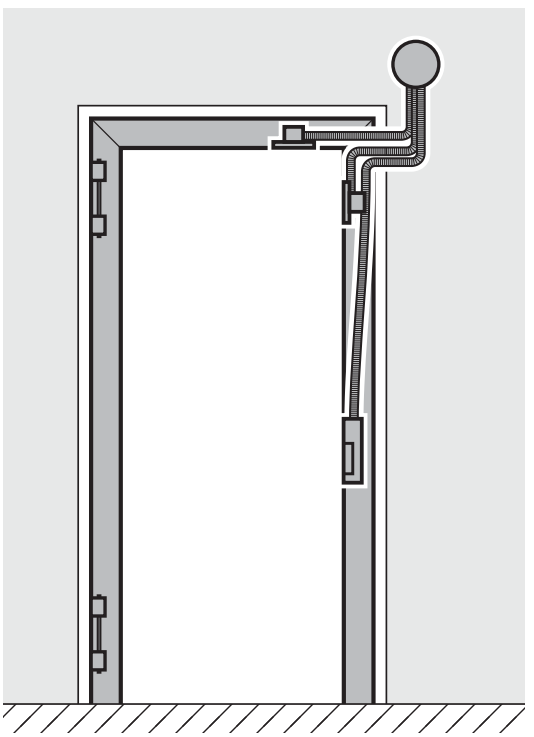

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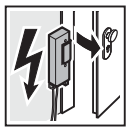
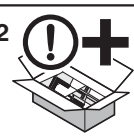
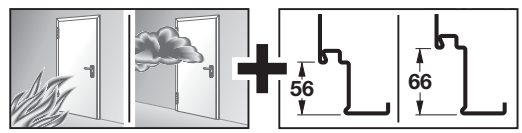


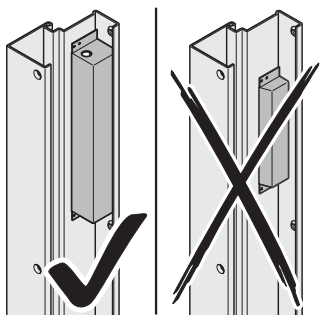
		AC ~	DC ⎓					
O & C	**8 EF**	×	×	×	×	×	×	×
effeff	**142 UF**	×		×	×	×	×	×
	143 F	×	×	×	×	×	×	×
	14 F/34 F	×				×	×	×
Dorma	**Basic**		×			×	×	×
	Lucky Basic 448		×			×	×	×
	Smoke		×		×	×	×	×
	Lucky Smoke 448		×		×	×	×	×

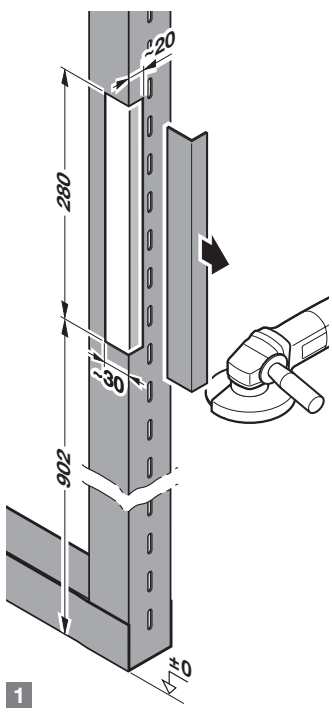
1.11

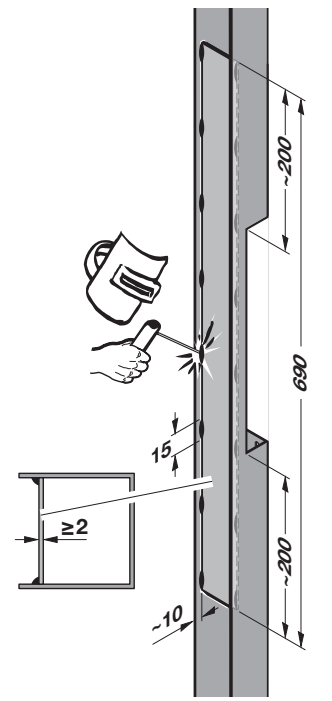
1.12

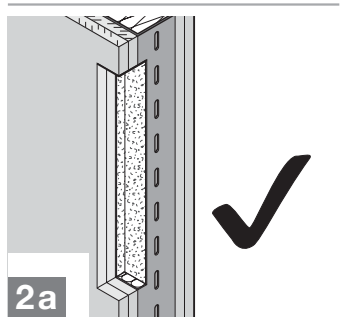


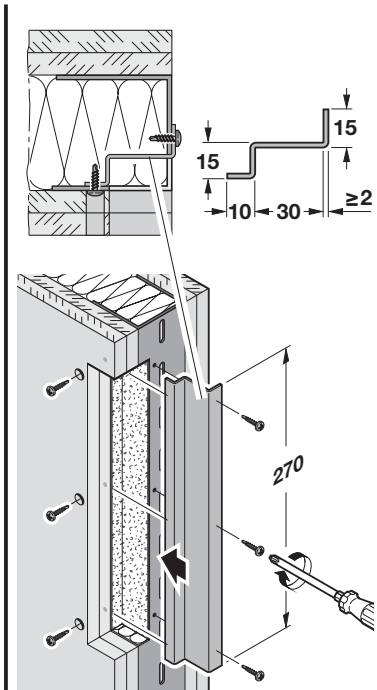


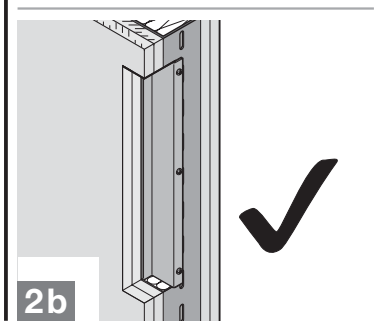


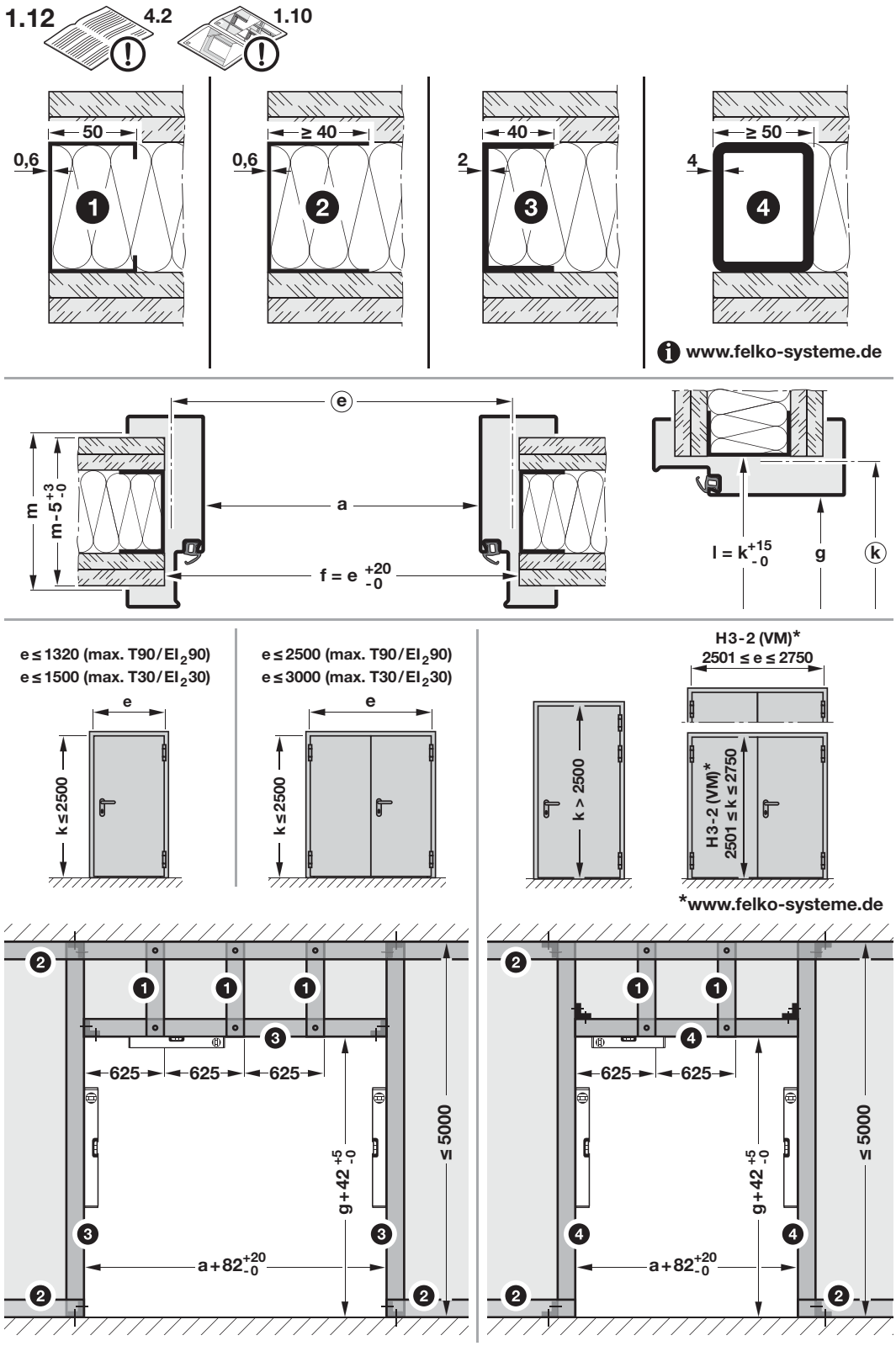








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www.felko-systeme.de
e
a
m
m - 5 +3 -0
f = e +20 -0
l = k +15 -0
g
k
e ≤ 1320 (max. T90/EI2 90)
e ≤ 1500 (max. T30/EI2 30)
e
k ≤ 2500
e ≤ 2500 (max. T90/EI2 90)
e ≤ 3000 (max. T30/EI2 30)
e
k ≤ 2500
k > 2500
H3-2 (VM)*
2501 ≤ e ≤ 2750
H3-2 (VM)*
2501 ≤ k ≤ 2750
*www.felko-systeme.de
625
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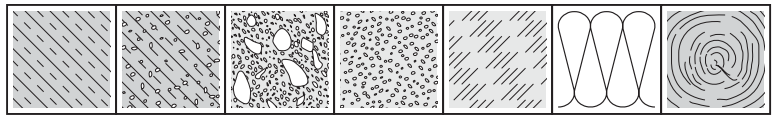

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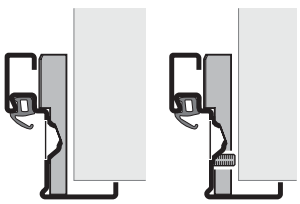

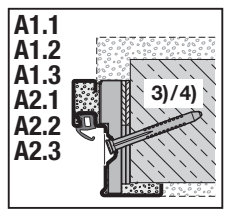

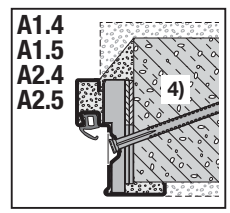

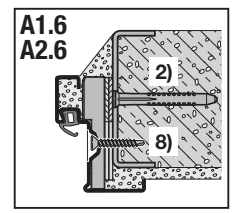

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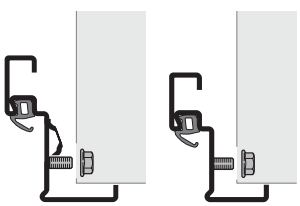

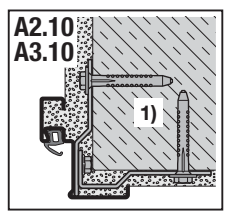

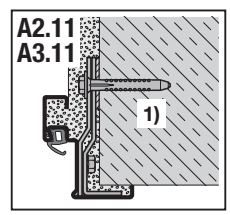

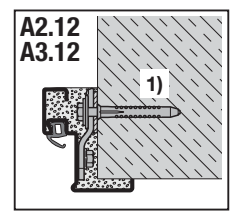

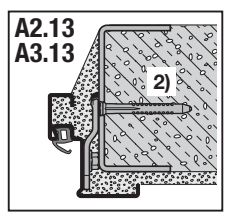

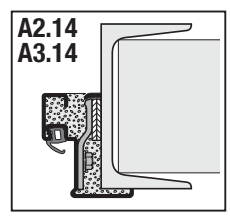

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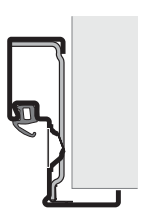

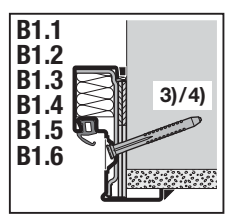

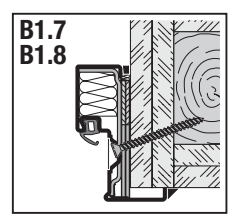

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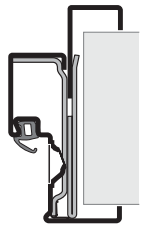

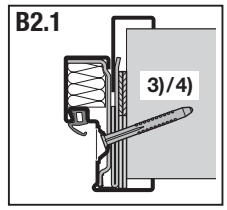

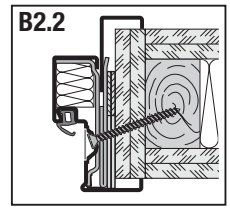

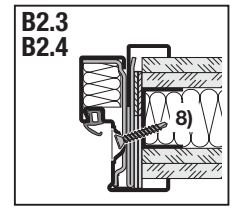

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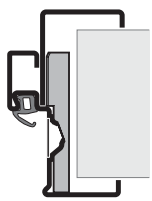

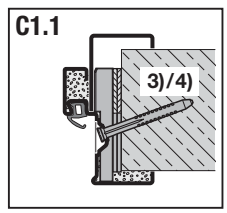

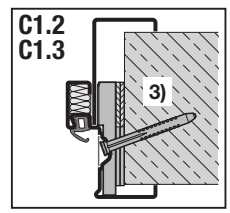

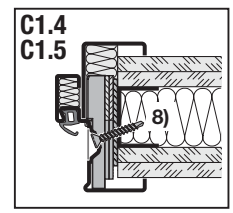

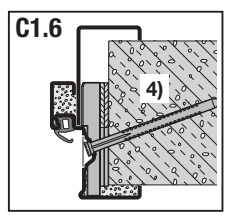

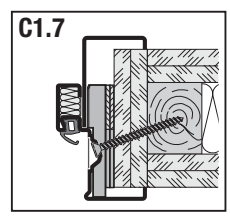

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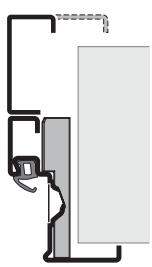

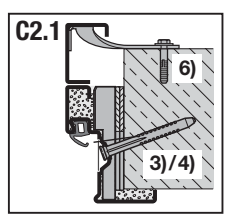

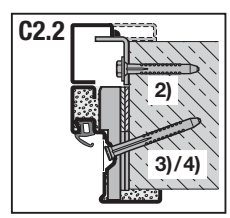

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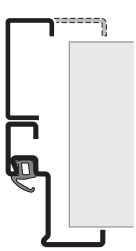

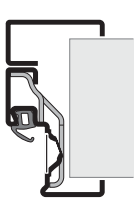

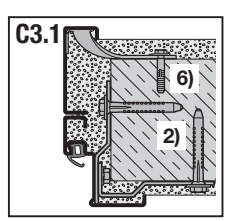

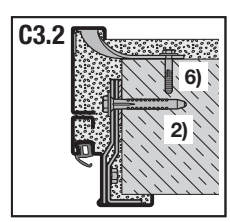

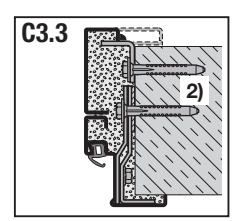

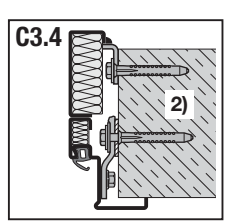

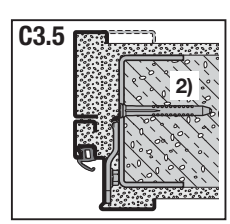

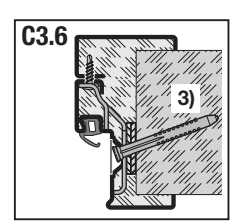

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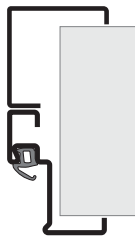

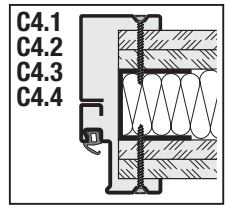

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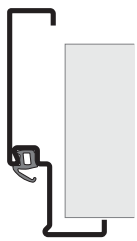
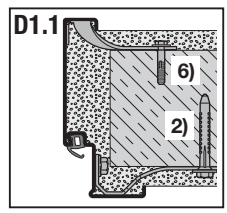
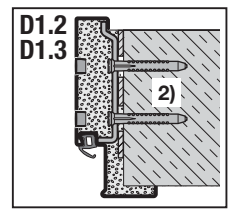
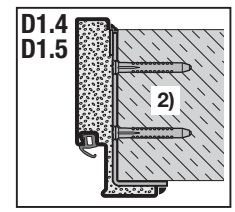
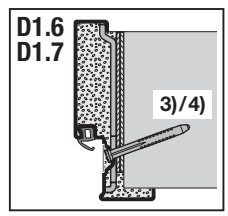
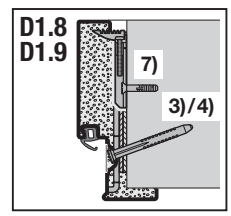




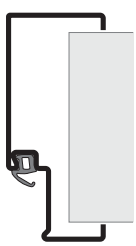


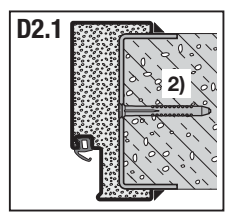


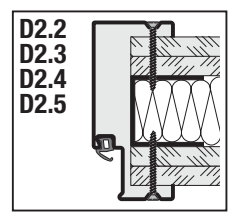




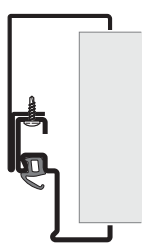
Typ 2

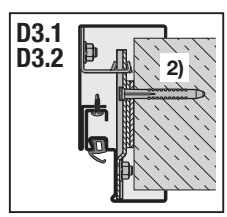


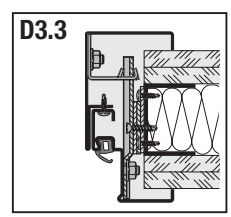


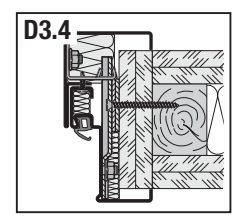


Typ 3



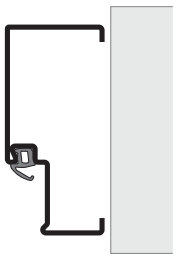


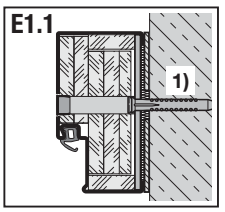


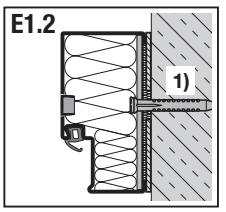


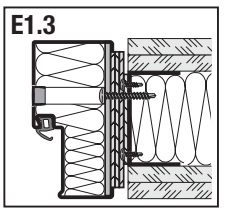
2E

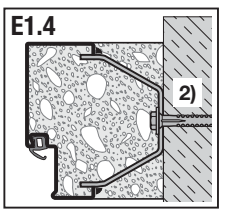
Typ 1

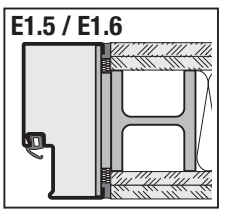




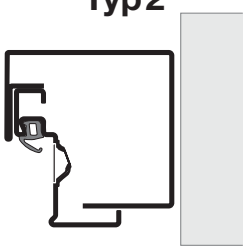


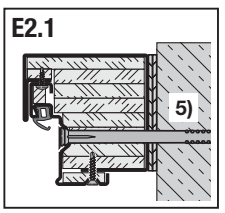


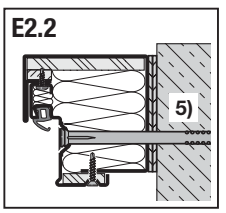


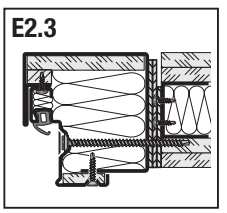


Typ 2









1) **Fischer:** FUR 10 × 80/100
Fischer: DuoXpand 10 × 80/100
CELO: HBR 10 × 80/100

Fischer: SXRL 10 × 80/100
Hilti: HRD 10 × 80/100
CELO: MFR 10 × 80/100
Würth: W-UR 10 × 80/100

2) **Fischer:** FUR 10 × 80/100/115
Fischer: DuoXpand 10 × 80/100/120
Fischer: SXRL 10 × 80/100/115
Hilti: HRD 10 × 80/100
CELO: MFR 10 × 80/100/115
CELO: HBR 10 × 80/100/115
Würth: W-UR 10 × 80/100/115

3) **Fischer:** FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

4) **Fischer:** FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

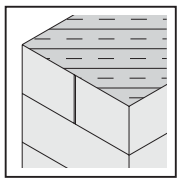
5) **Fischer:** FUR 10 × 200
Fischer: DuoXpand 10 × 200
CELO: HBR 10 × 200

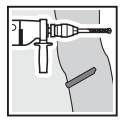
6) 8 × 40

7) 10 × 50 - 10 × 80

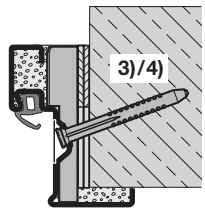
8)

2A **Typ 1** **Typ 2**

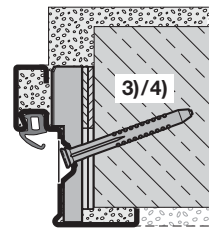




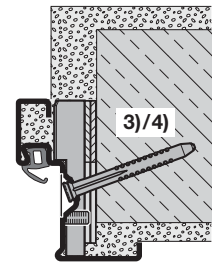
A1.1
A2.1



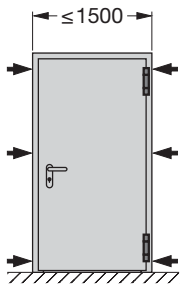
A1.2
A2.2



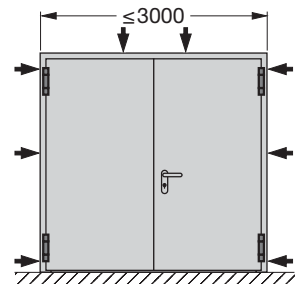
A1.3
A2.3



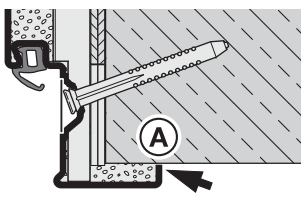
D65 - 1 OD

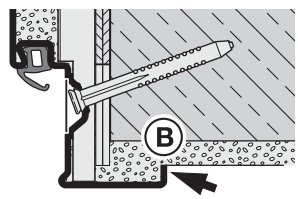


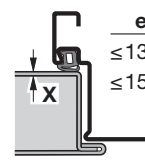
D65 - 2 OD



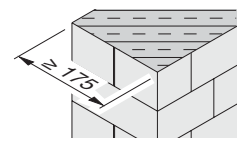
3) **Fischer:** FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100



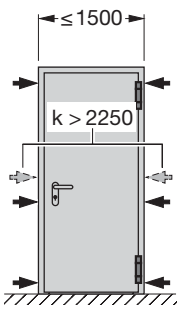




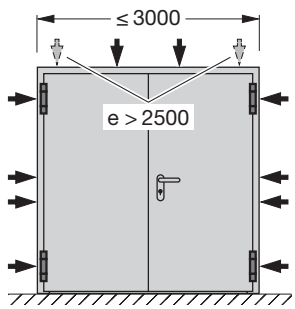
e	X
≤1320	1,0/1,5
≤1500	1,0



H3 - 1 OD



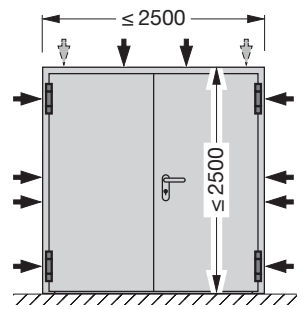
H3 - 2 OD



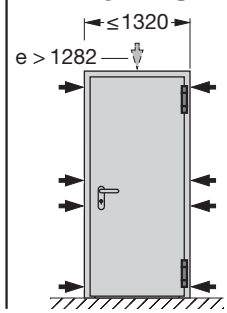
k ≤ 2500 → **3)** **Fischer:** FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

k > 2500 → **4)** **Fischer:** FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

H6 - 2 OD
H16 - 2 OD



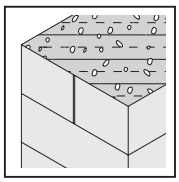
H6 - 1 OD
H16 - 1 OD

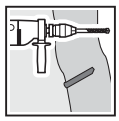


4) **Fischer:** FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

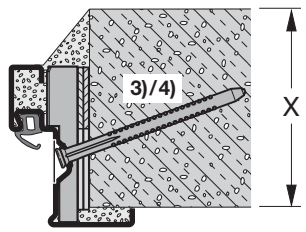
→ **A1.1 - A2.5** 1 2 3 4

2A Typ 1 Typ 2

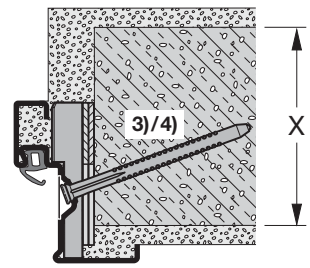




A1.4 A2.4

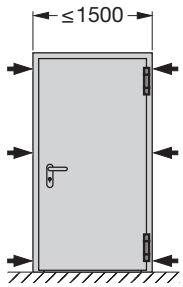


A1.5 A2.5

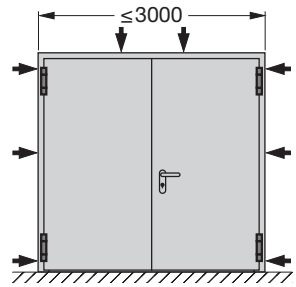


X ≥ 150 ➔ **max. T30/EI$_2$30** X ≥ 200 ➔ **max. T60/EI$_2$60**
➔ **max. T90/EI$_2$90**

D65 - 1 OD

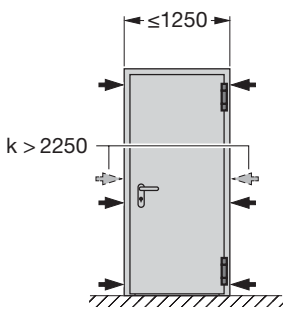


D65 - 2 OD



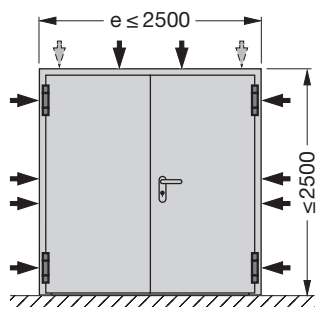
3) Fischer: FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

H3 - 1 OD



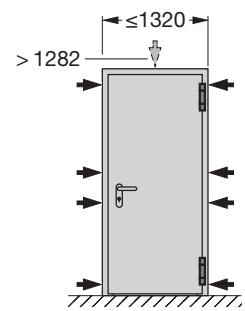
4) Fischer: FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

H3 - 2 OD



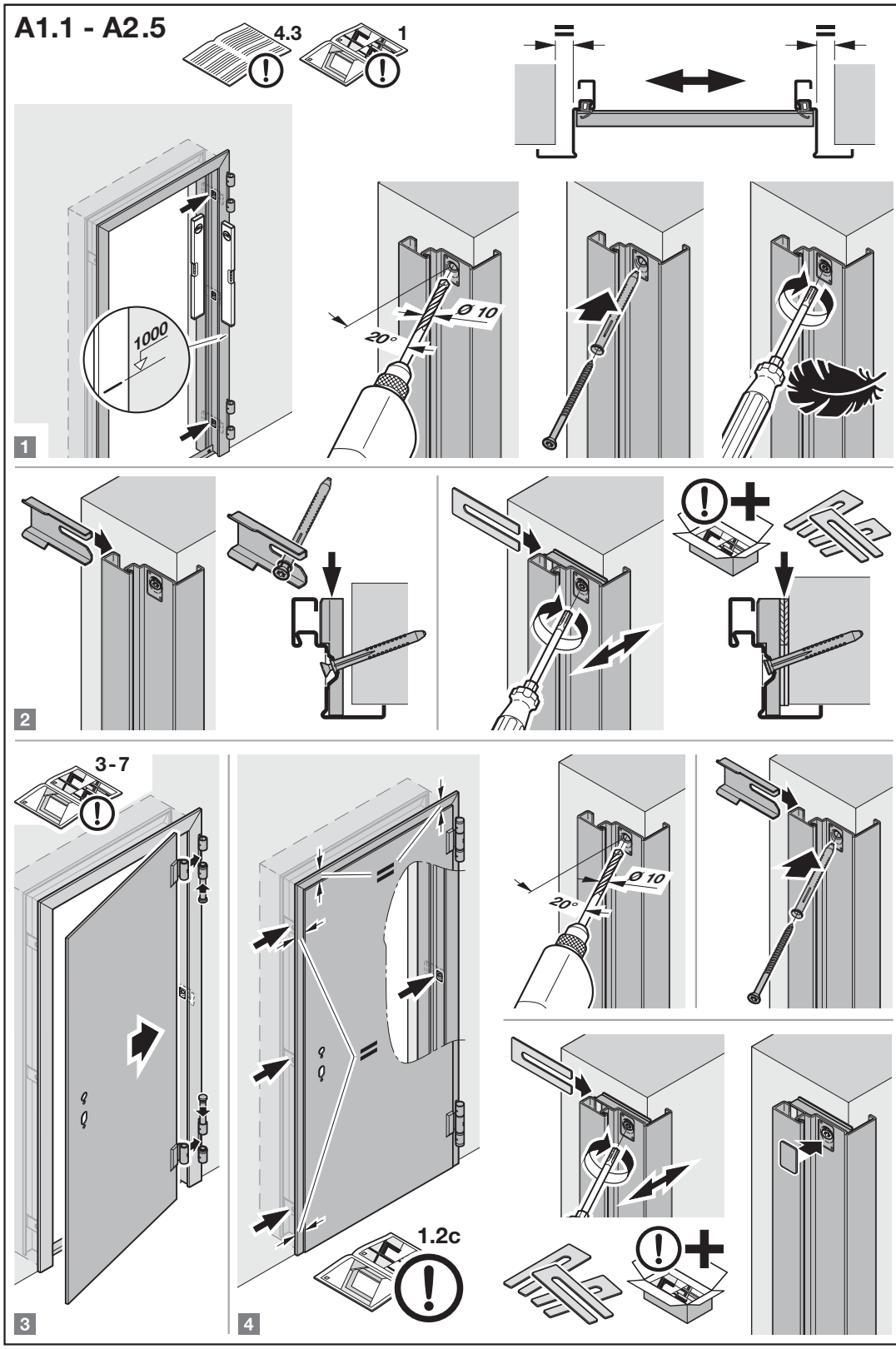
4) Fischer: FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

H6 - 1 OD
H16 - 1 OD



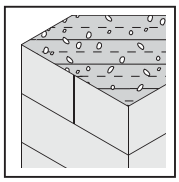
4) Fischer: FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

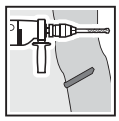
➔ **A1.1 - A2.5** 1 2 3 4

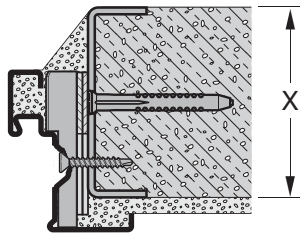

A1.1 - A2.5
4.3
1
1000
Ø 10
20°
1
2
3-7
1.2c
3
4

2A Typ 1, Typ 2

A1.6
A2.6



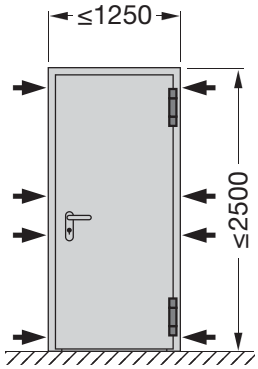




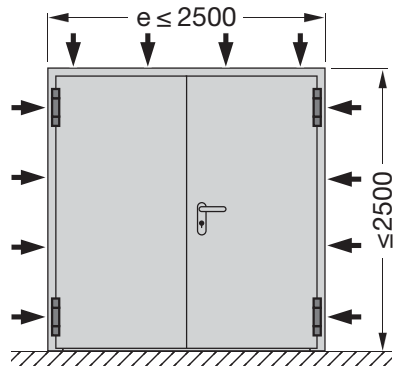
X ≥ 150 ➡ **max. T30/EI$_2$30**

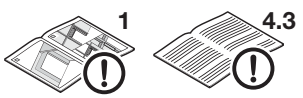
X ≥ 175 ➡ **max. T60/EI$_2$60**
➡ **max. T90/EI$_2$90**

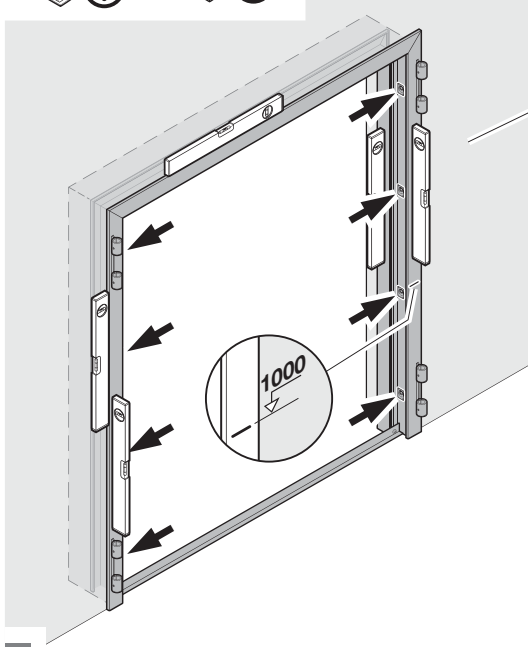
H16-1 OD

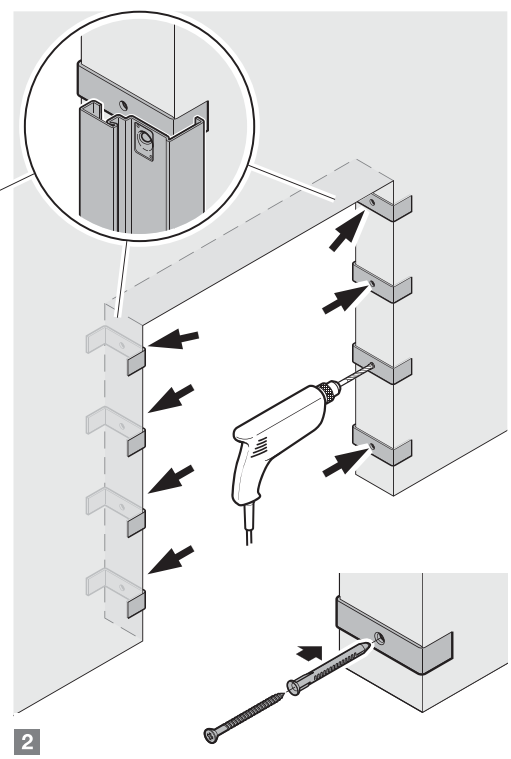


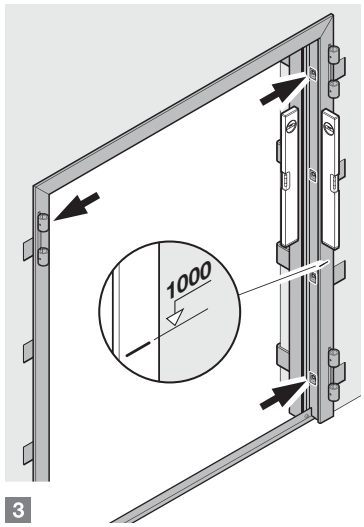
H16-2 OD











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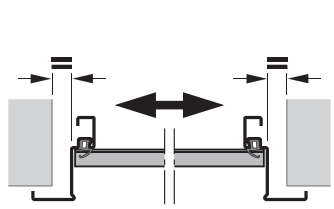

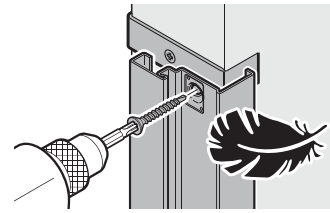

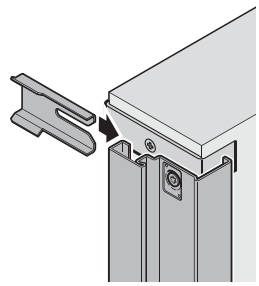

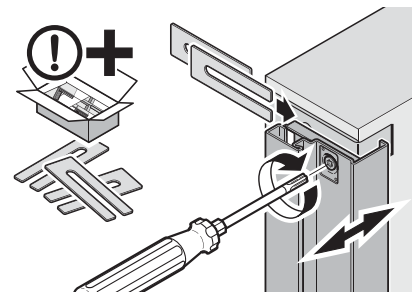

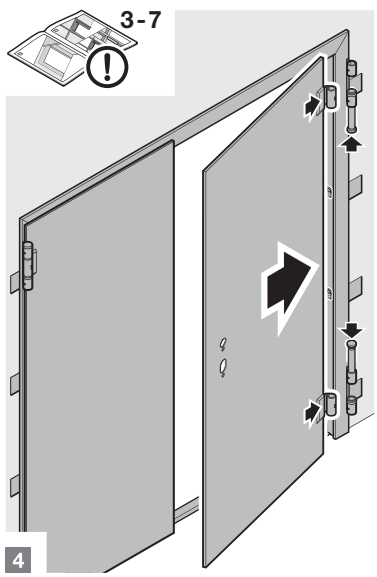

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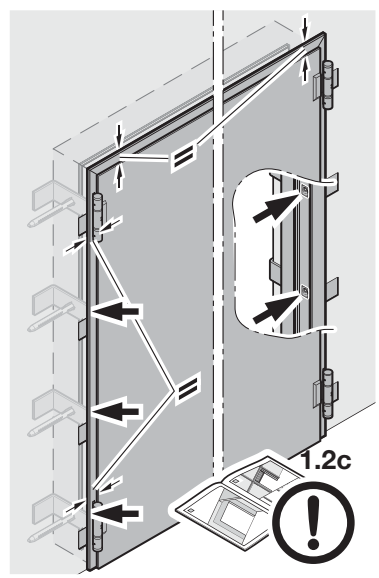

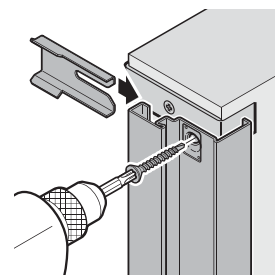

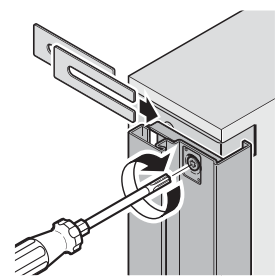

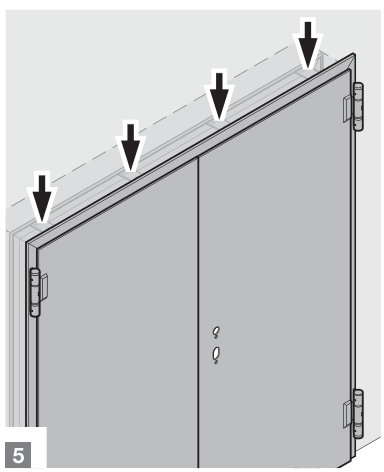

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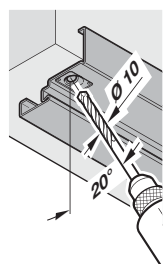

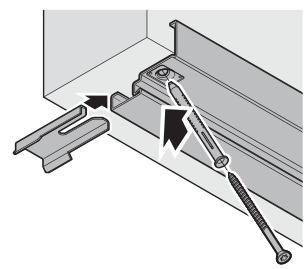

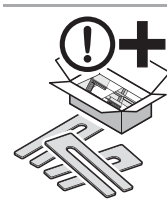

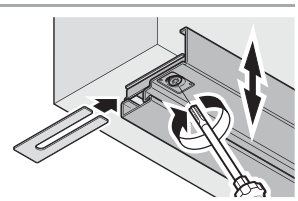

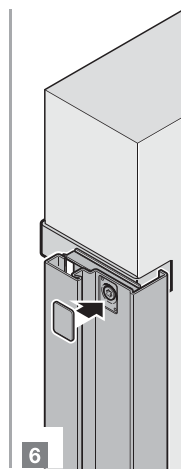

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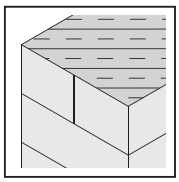
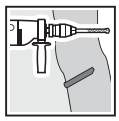
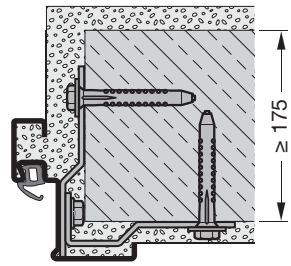
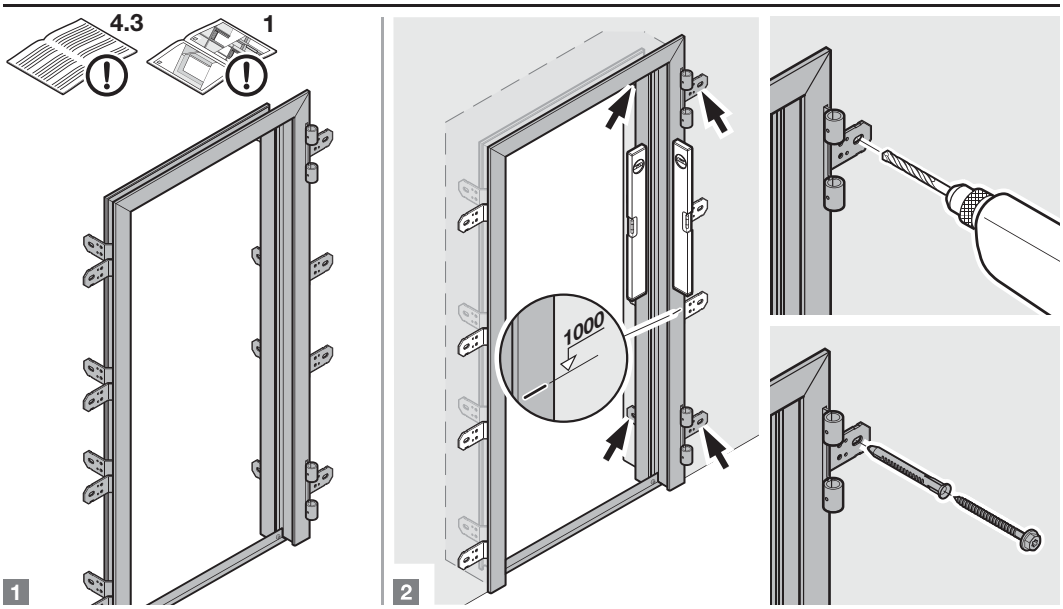
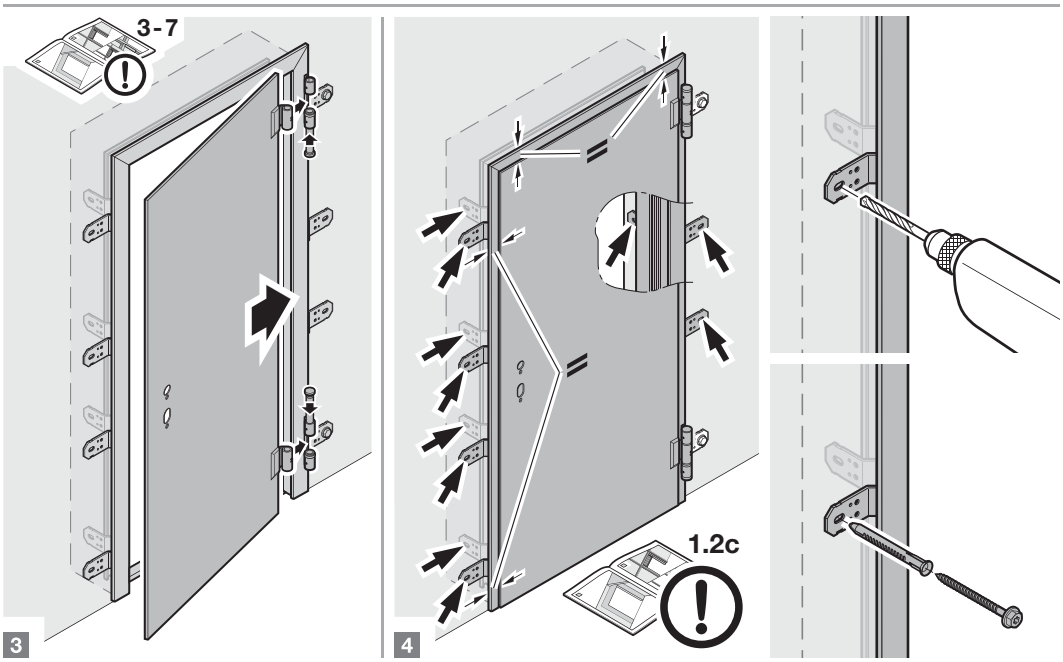
2A Typ 2 / A2.10
Typ 3 / A3.10



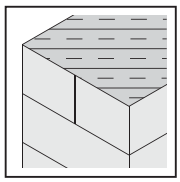


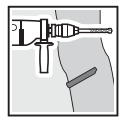


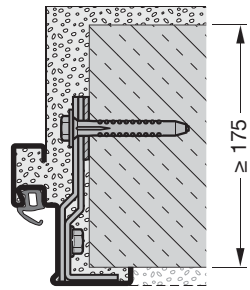


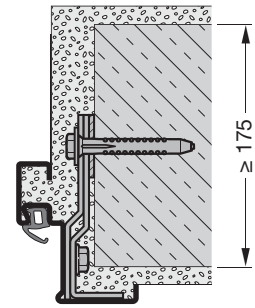


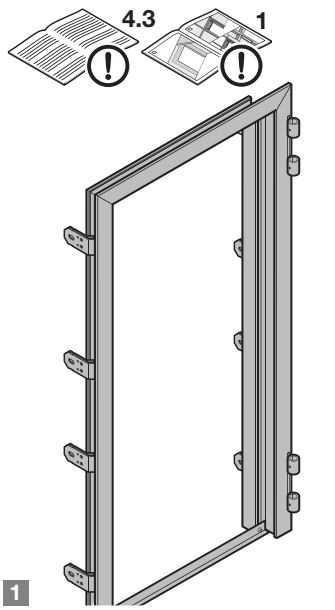
2A Typ 2 / A2.11
Typ 3 / A3.11

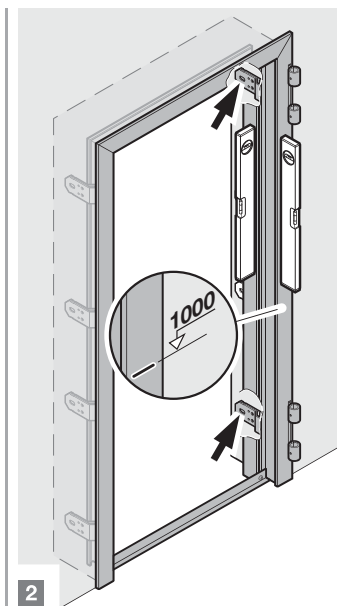


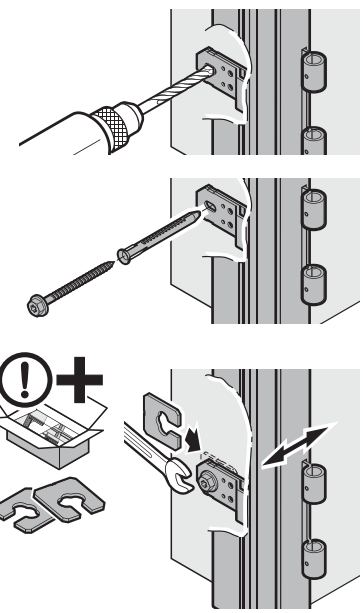


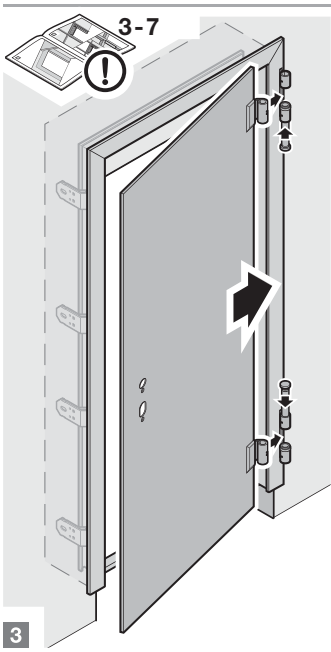


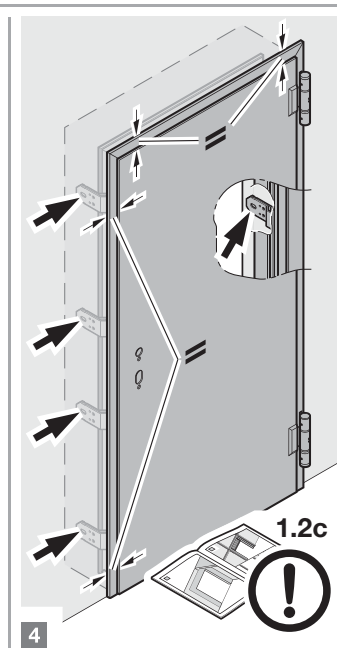


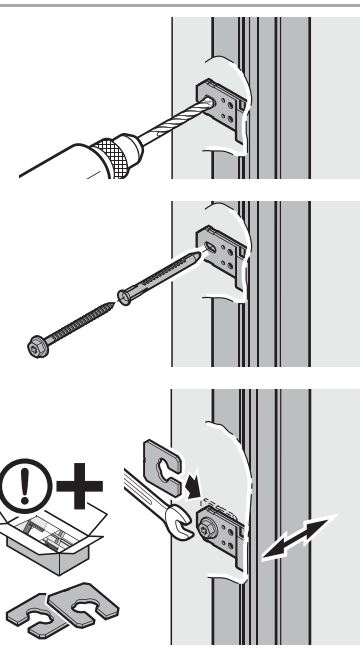












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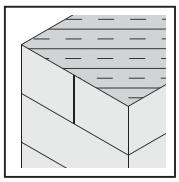
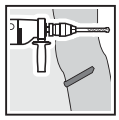
Typ 3 / A3.12





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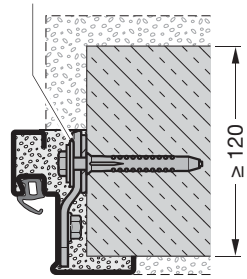

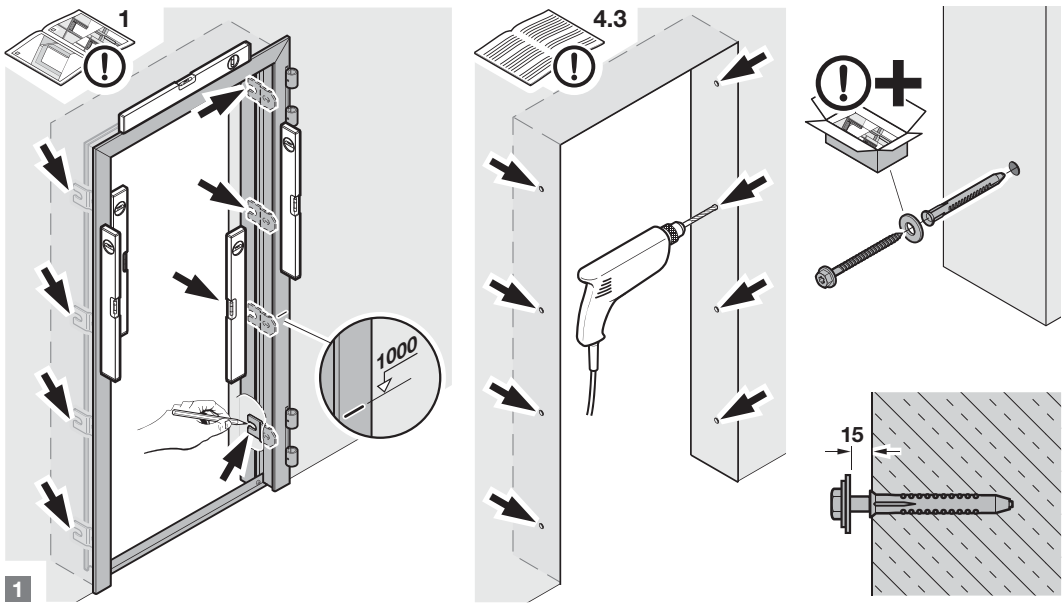

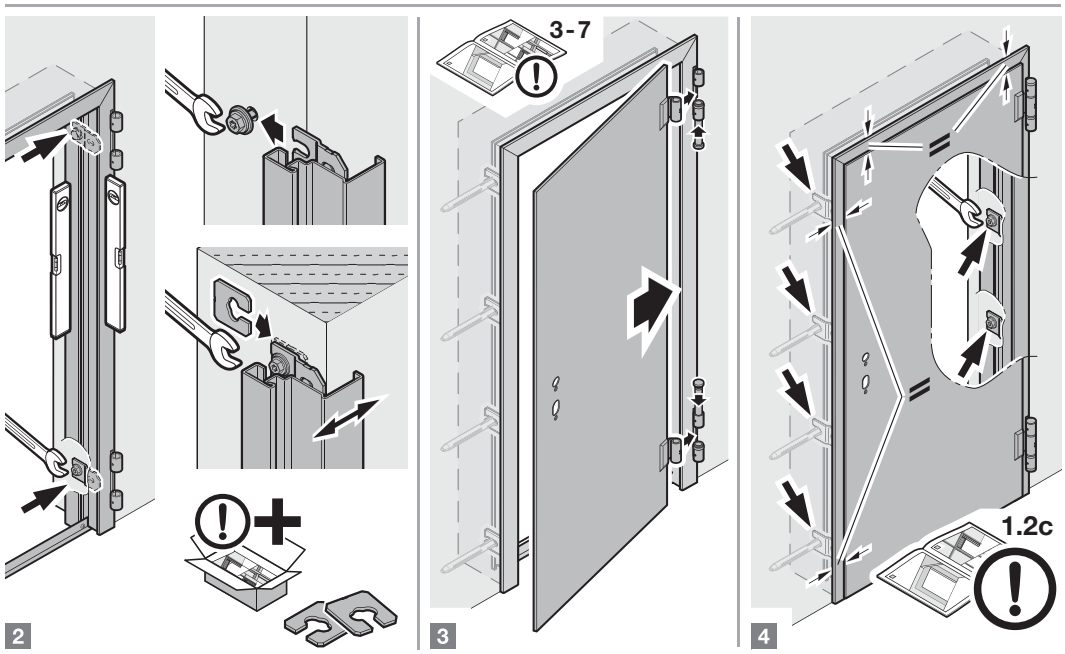

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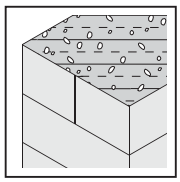
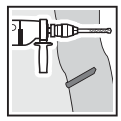
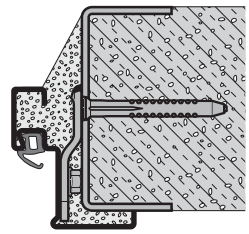
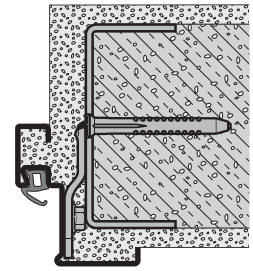
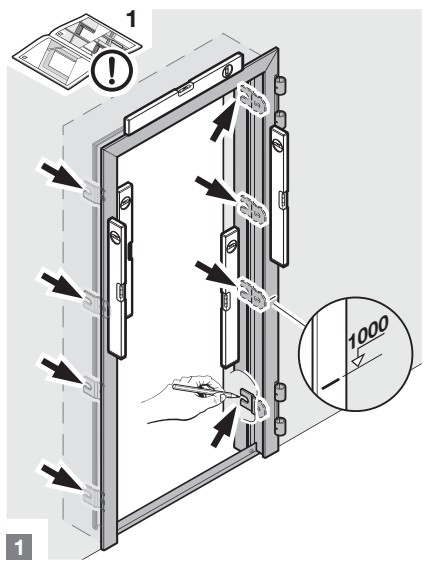
Typ 3 / A3.13

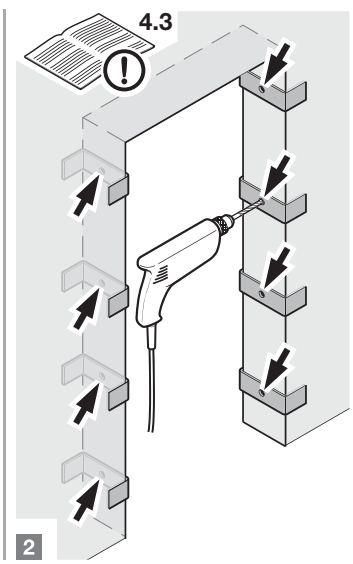


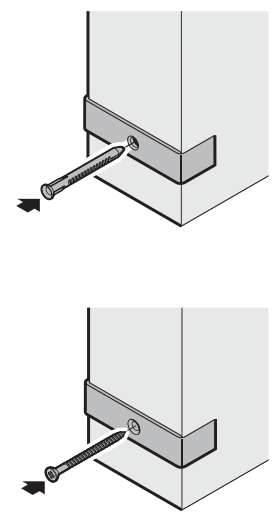


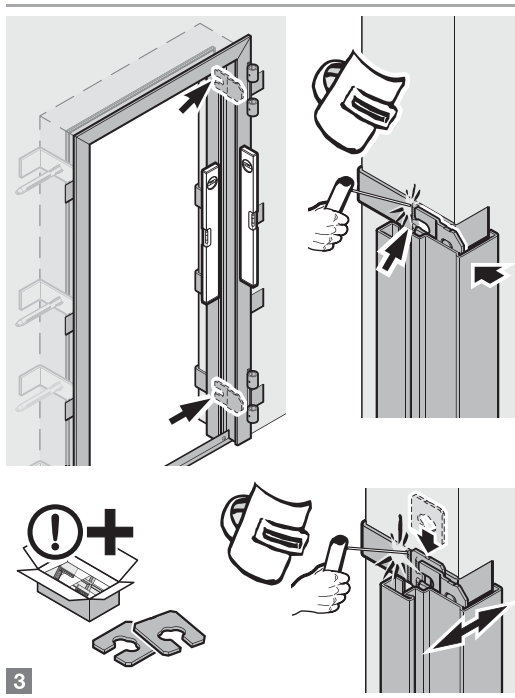


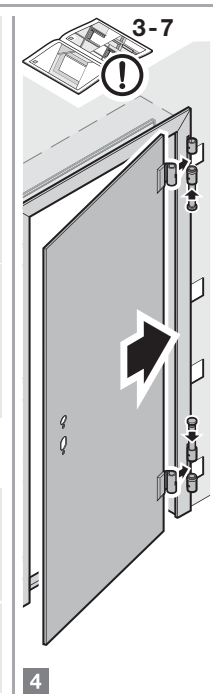


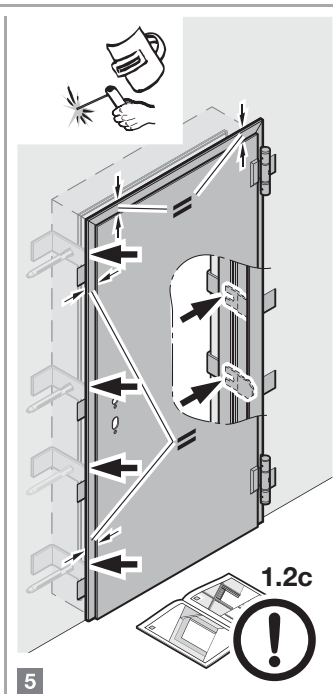




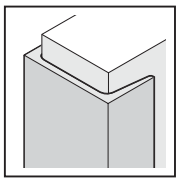


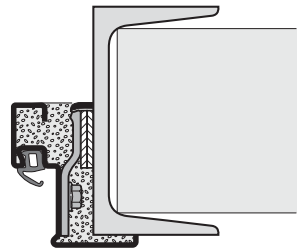


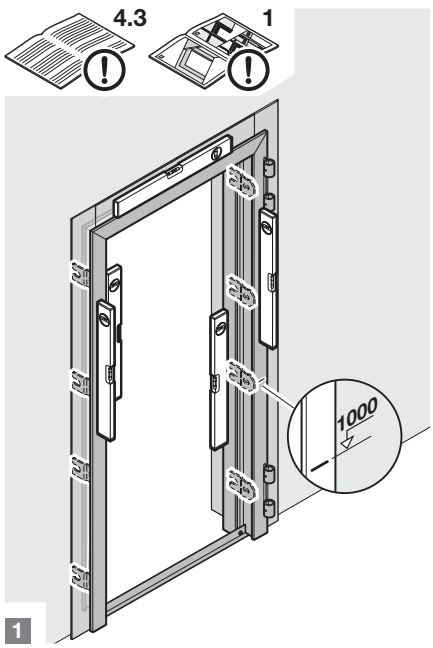


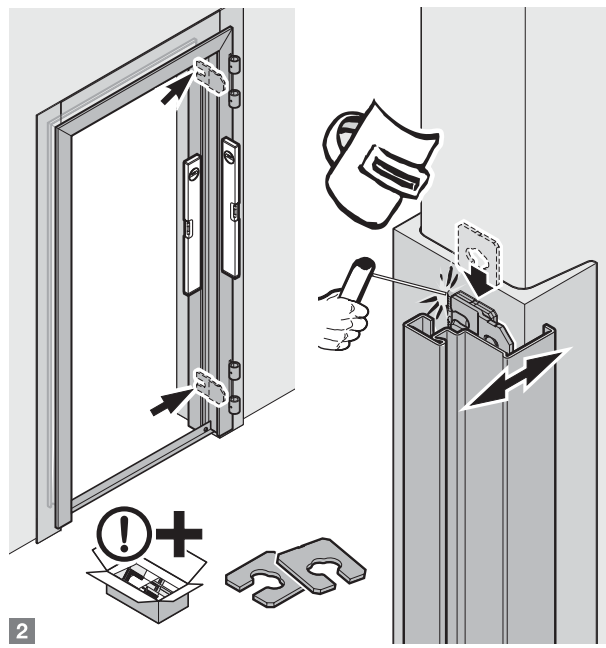


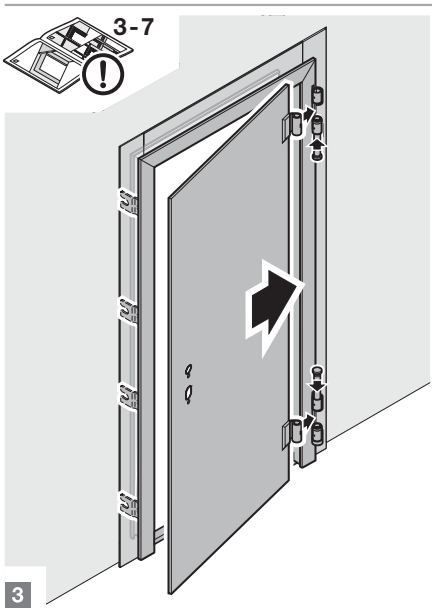
2A Typ 2 / A2.14
Typ 3 / A3.14

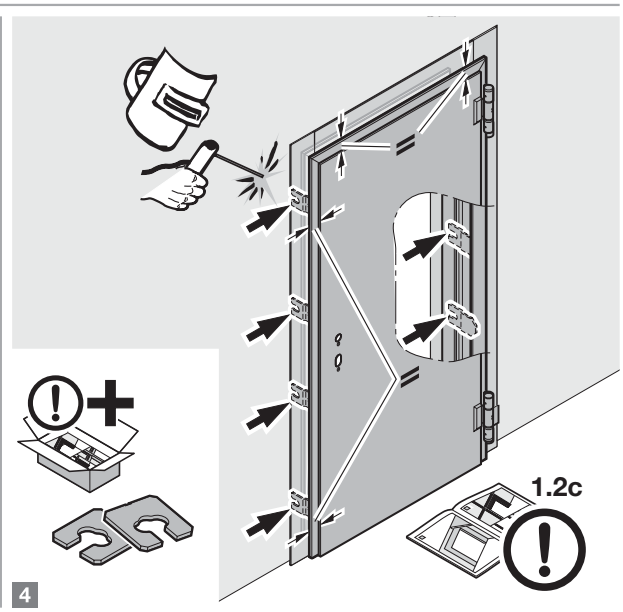












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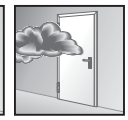
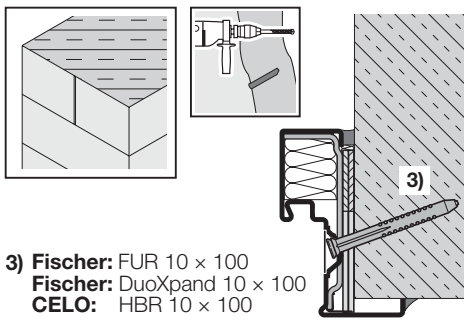
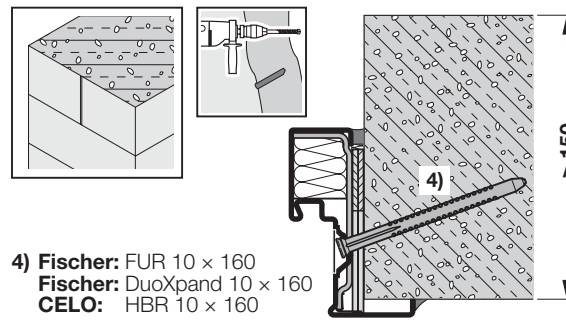


D65



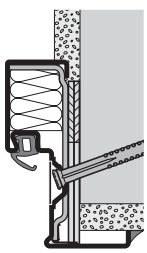
3) Fischer: FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100



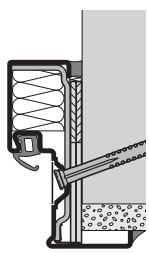
4) Fischer: FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

max. T30 / EI$_2$30

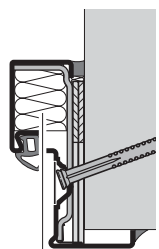
B1.1



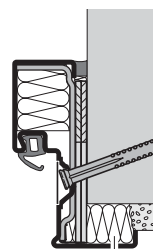
B1.2



B1.3

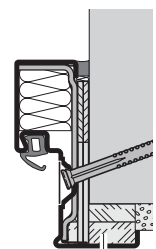


B1.4

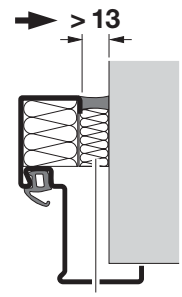


ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100

B1.5

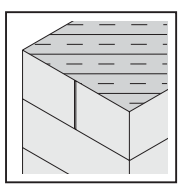


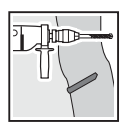
A - EN 520



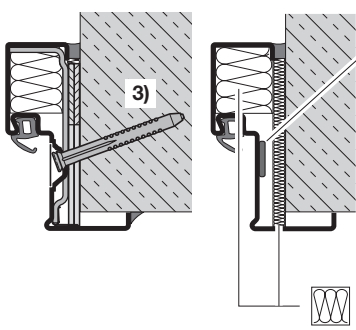
ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100

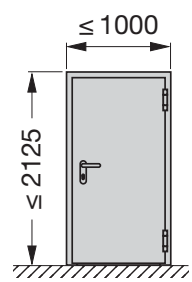
B1.6

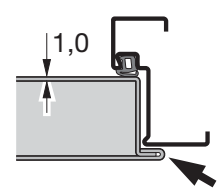




max. T90 / EI$_2$90

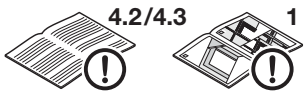


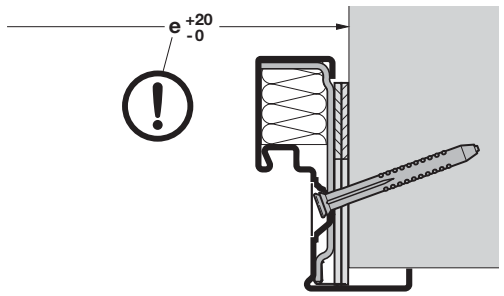


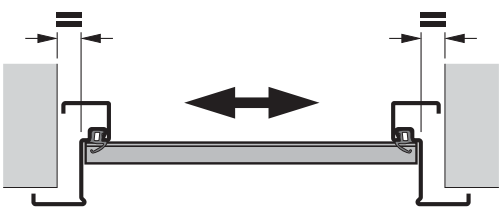


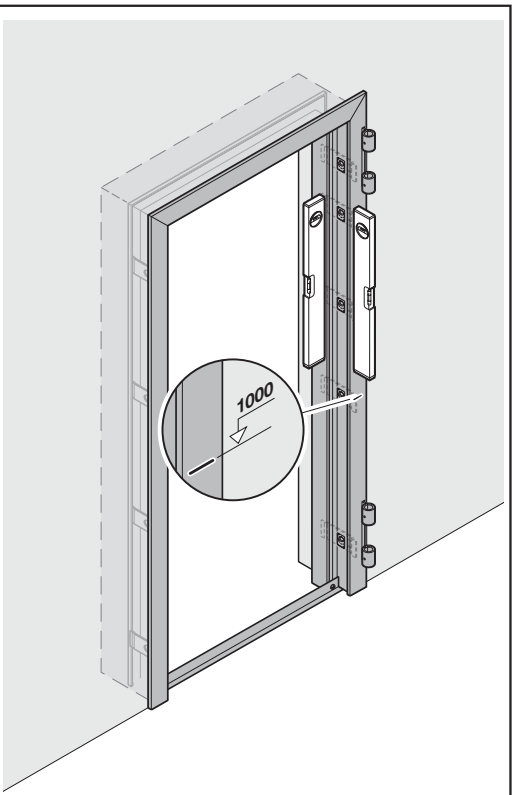
3) Fischer: FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

→ **B1.1 - B1.6** 1 2 3 …

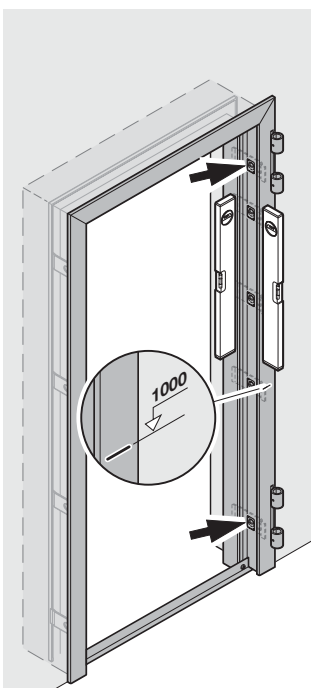


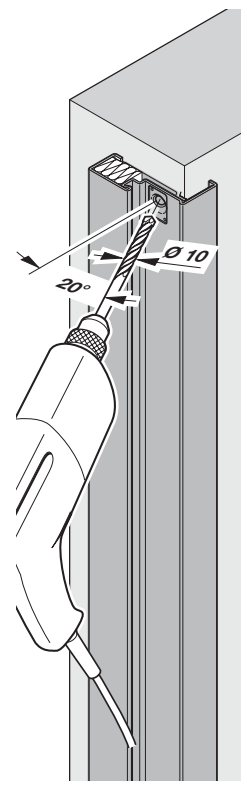


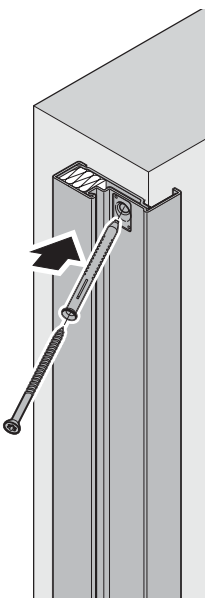


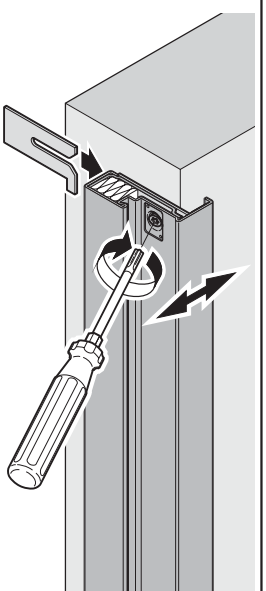


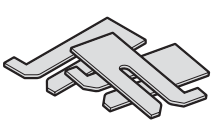
1











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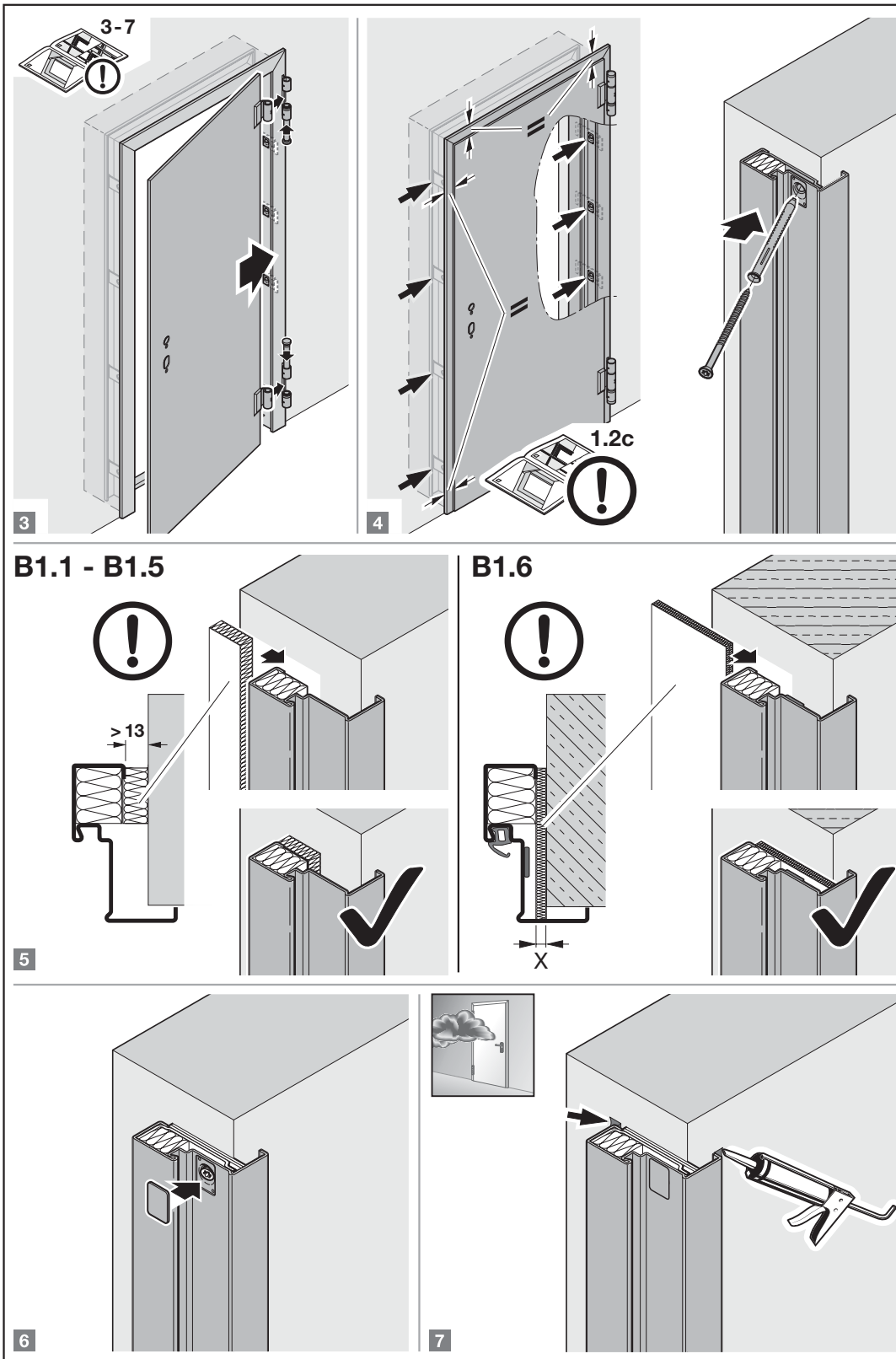
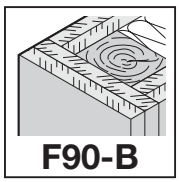

3-7
3
4
1.2c
B1.1 - B1.5
B1.6
> 13
X
5
6
7

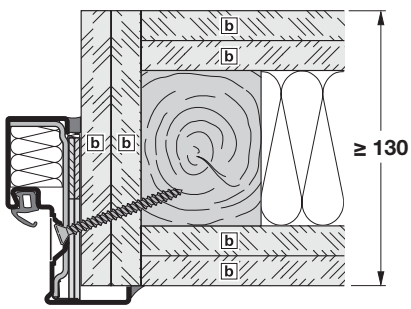
2B **Typ 1**

D65

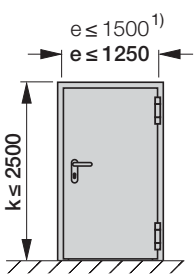
B1.7

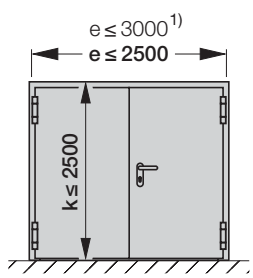


F90-B DIN 4102-4 Tab. 10.3

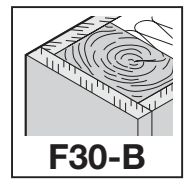


b DF-12,5-EN 520

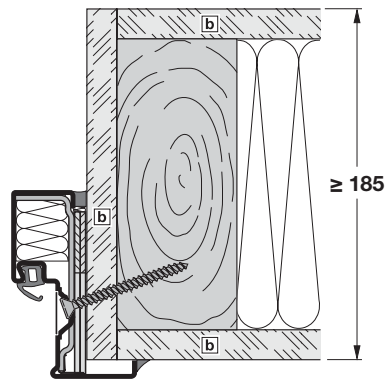




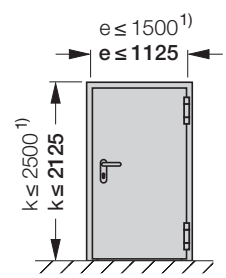
B1.8

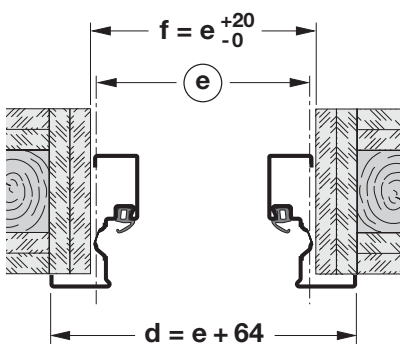


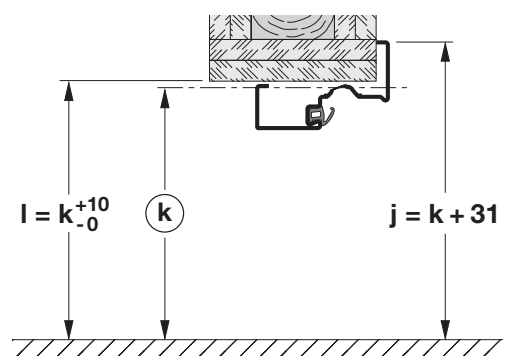
F30-B AbP Nr. P-SAC-02 / III-668



b DF-12,5-EN 520

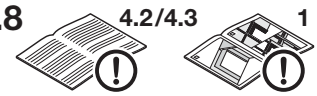


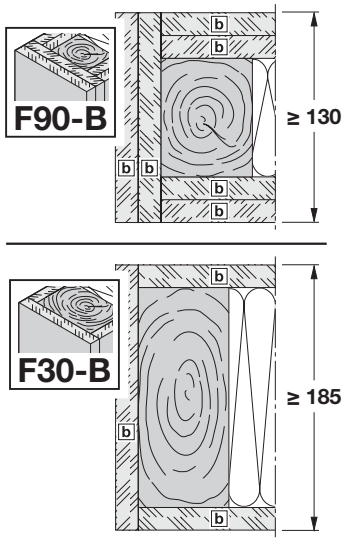




→ B1.7 / B1.8 1 2 3 …

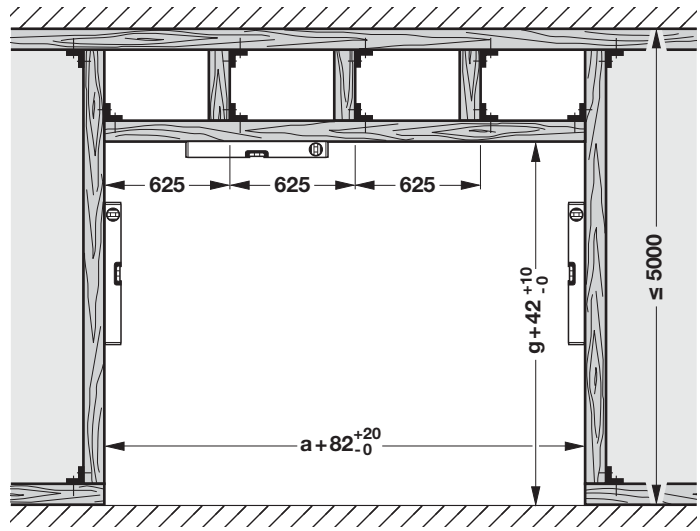
B1.7 / B1.8

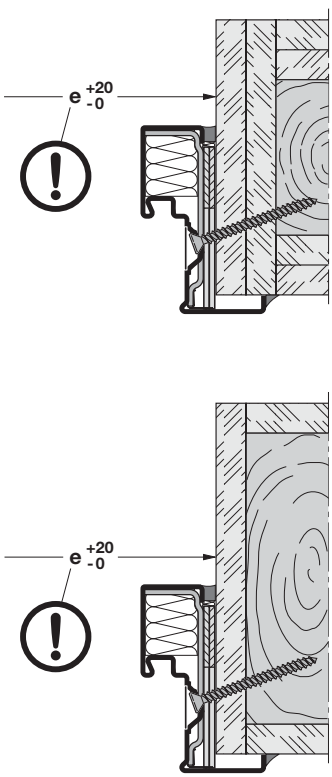


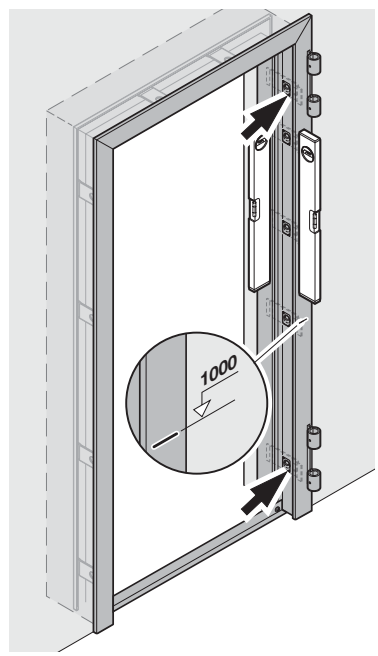


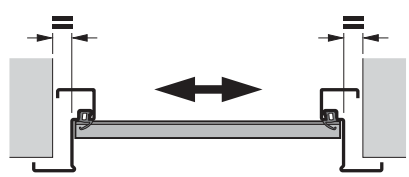
b DF-12,5-EN 520

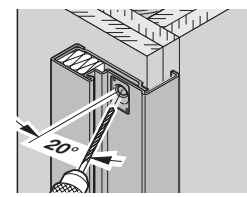
1

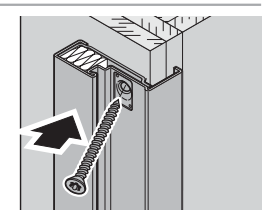


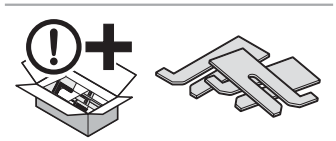


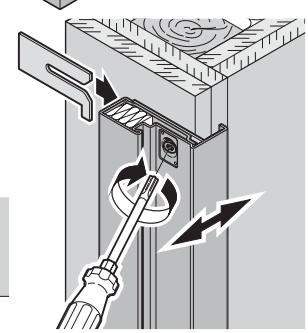










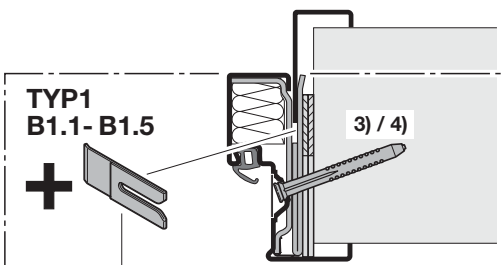


2

2B Typ 2
max. T30 / EI$_2$30

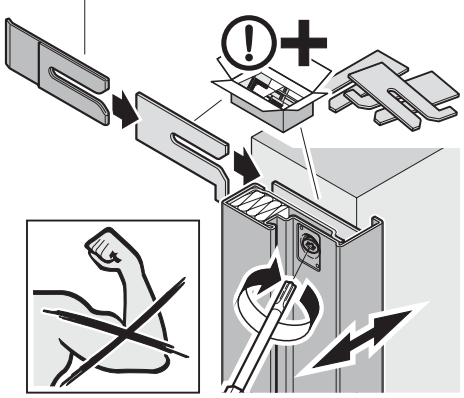
EPDM+ (CR)

B2.1



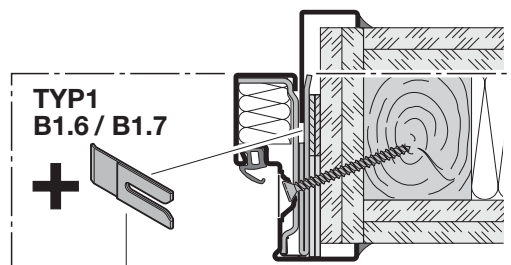
3) Fischer: FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

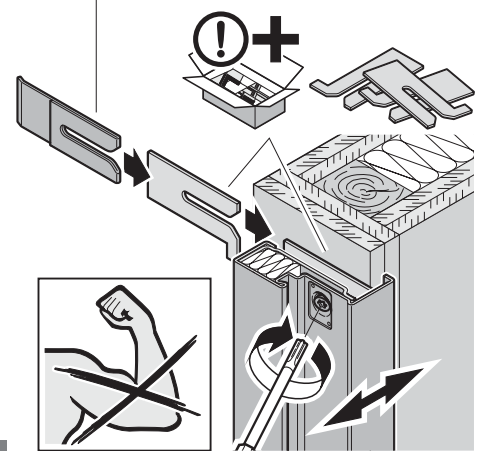
4) Fischer: FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160



1

B2.2





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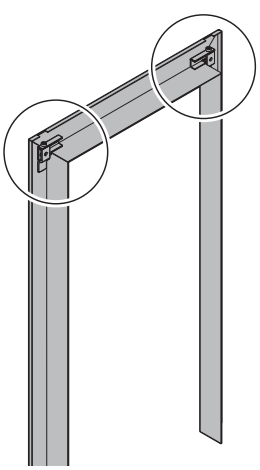

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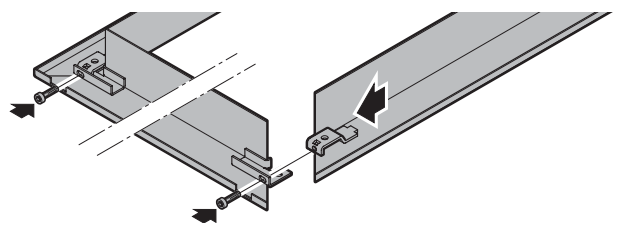
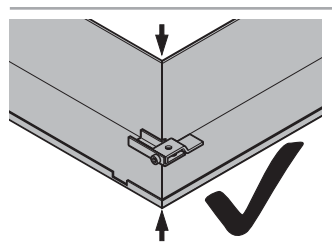
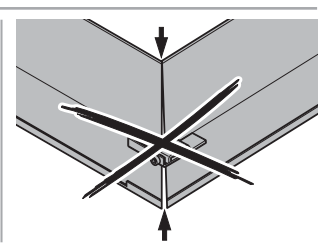
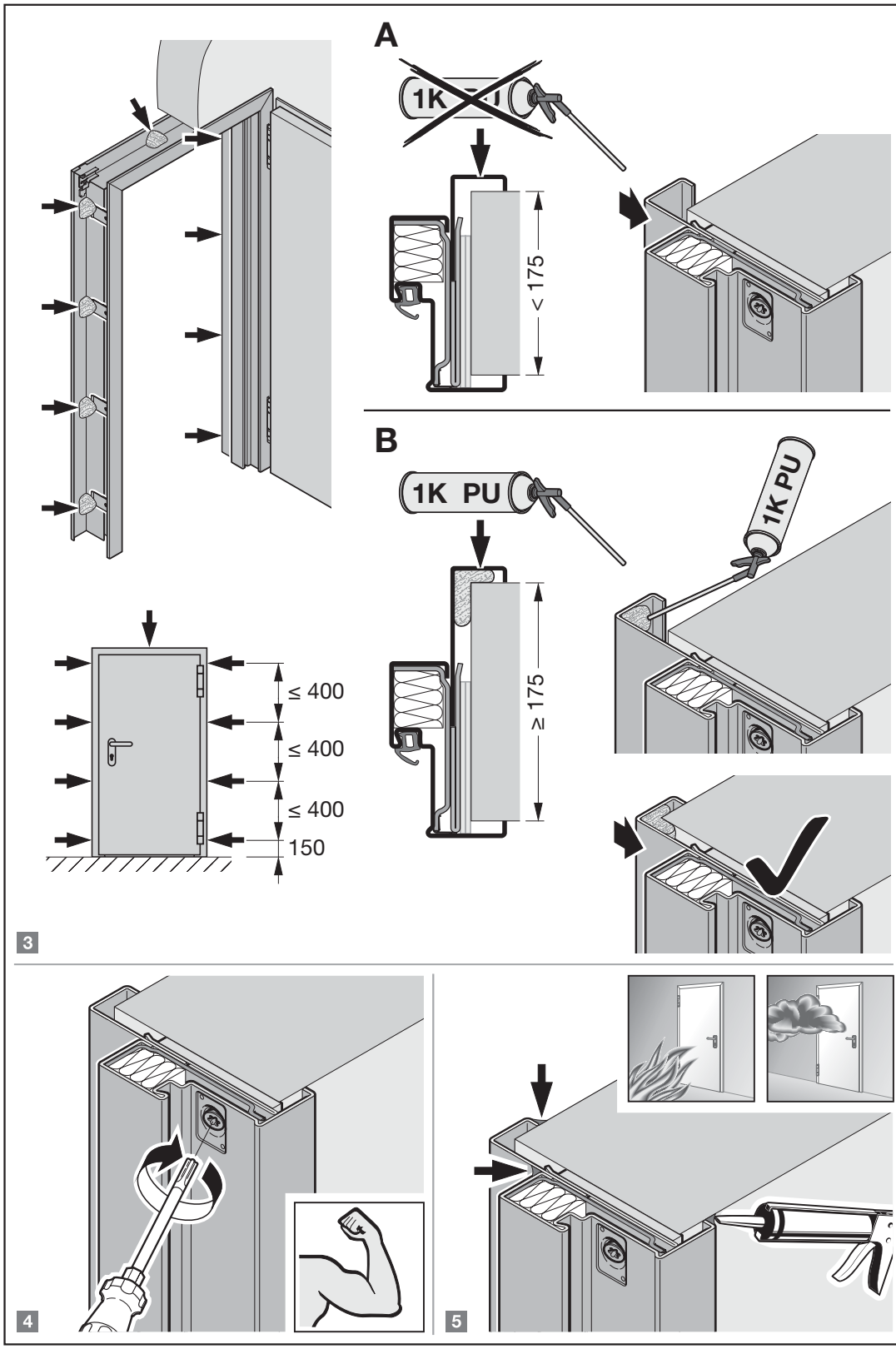


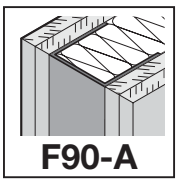




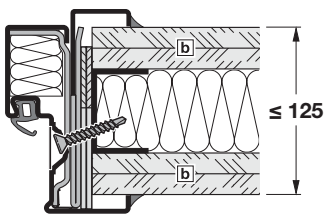

A
1K PU
< 175
B
1K PU
1K PU
≥ 175
≤ 400
≤ 400
≤ 400
150
3
4
5

2B Typ 2
max. T30/EI$_2$30

B2.3

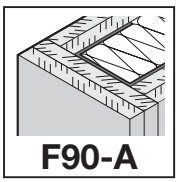


F90-A DIN 4102 Tab. 10.2

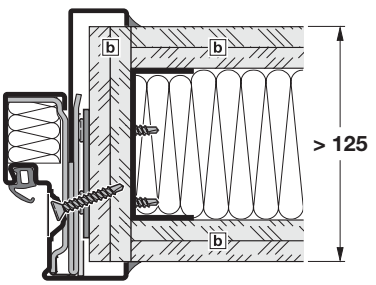


b DF-12,5-EN 520

B2.4

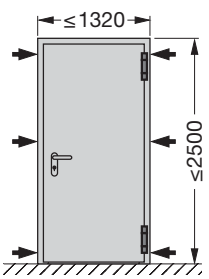


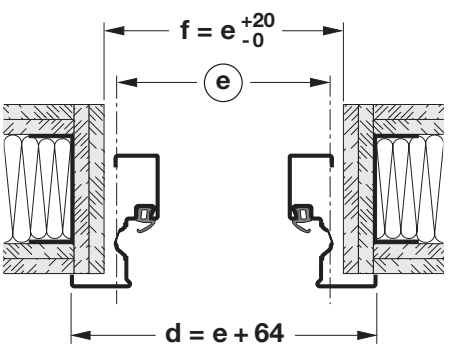
F90-A DIN 4102 Tab. 10.2

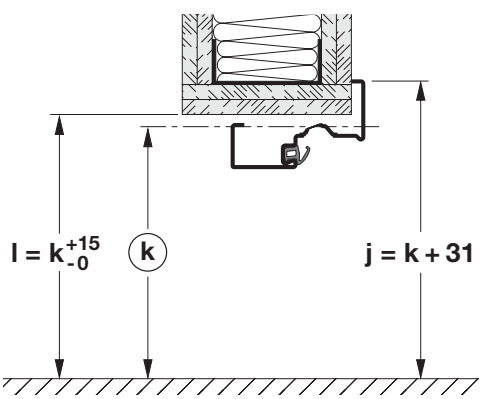


b DF-12,5-EN 520

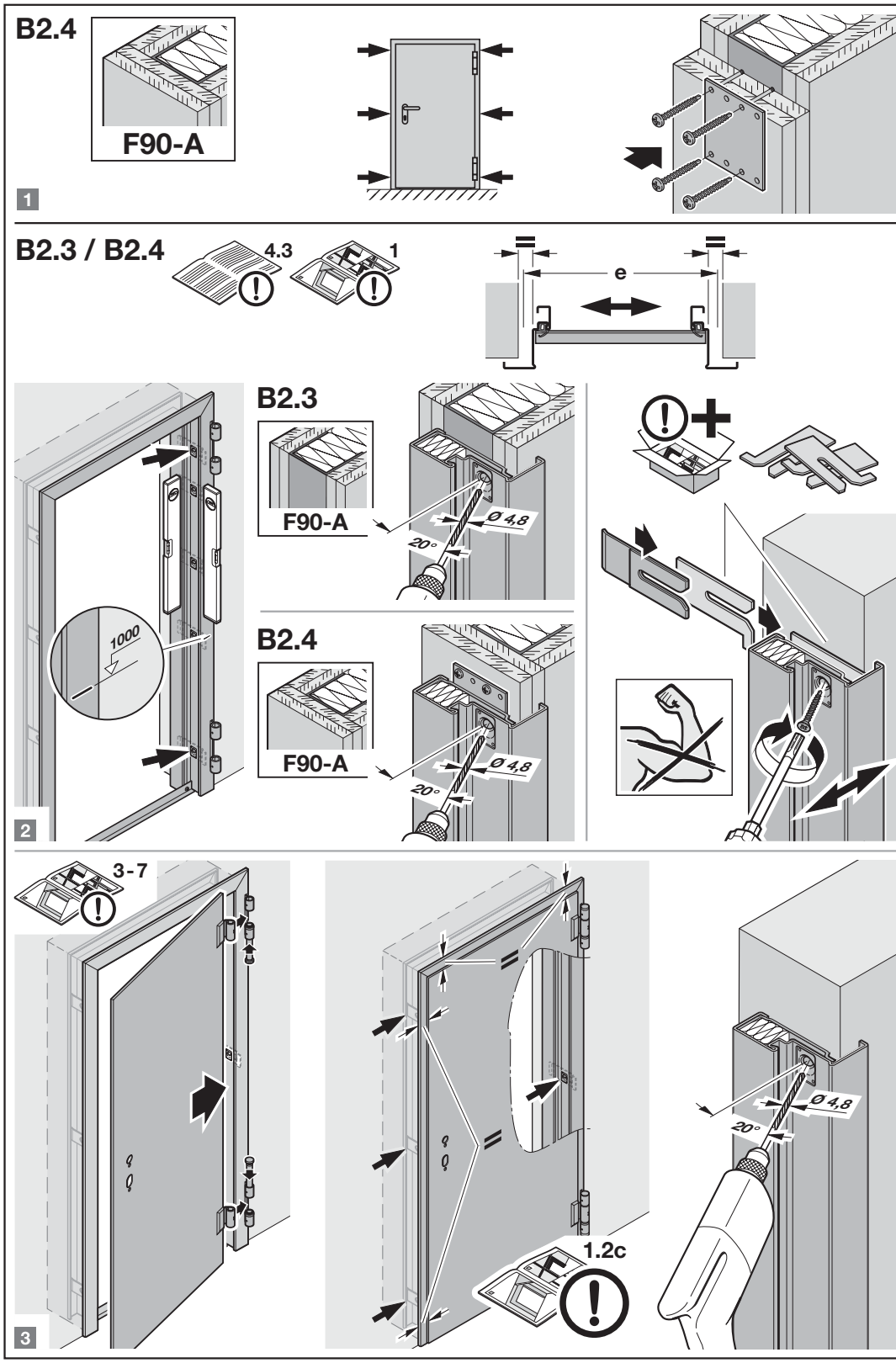
H3-1 OD

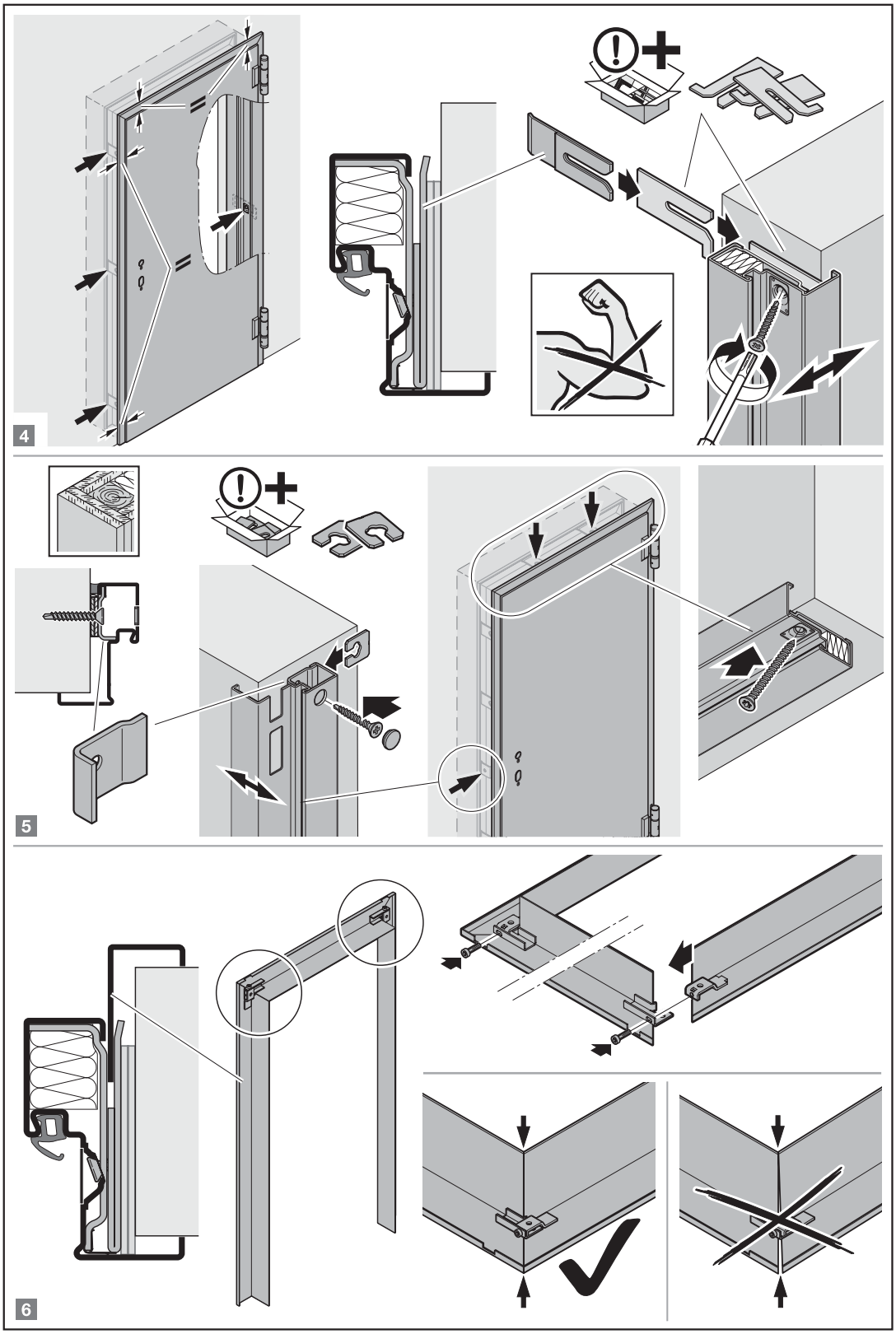


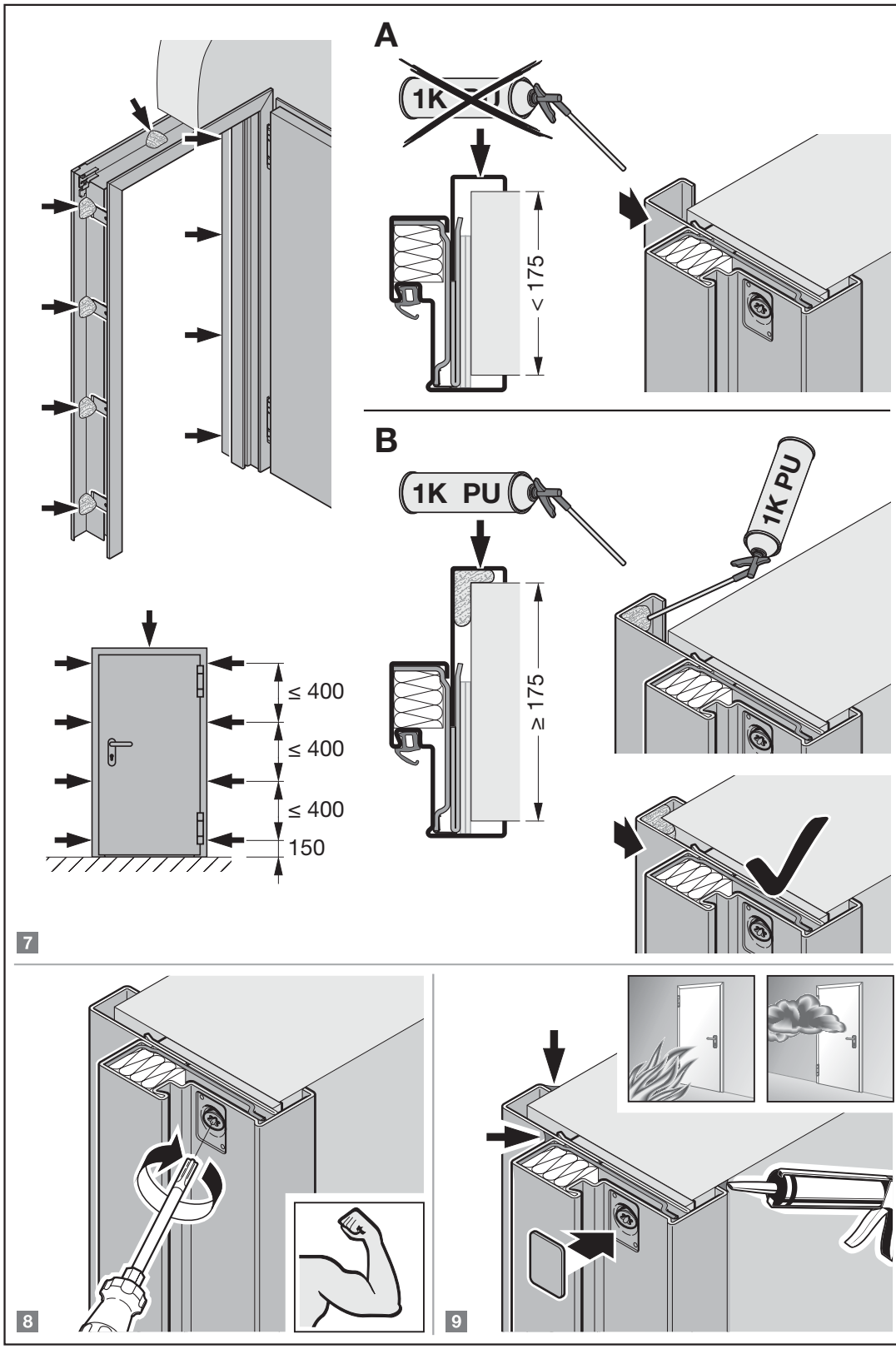




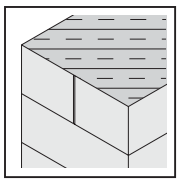
→ B2.3 / B2.4 1 2 3 …

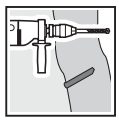

B2.4
F90-A
1
B2.3 / B2.4
4.3
1
e
B2.3
F90-A
Ø 4,8
20°
B2.4
F90-A
Ø 4,8
20°
1000
2
3-7
1.2c
Ø 4,8
20°
3


4
5
6

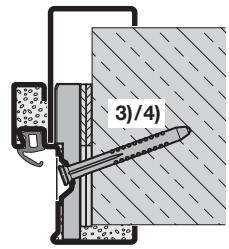

A
1K PU
< 175
B
1K PU
1K PU
≥ 175
≤ 400
≤ 400
≤ 400
150
7
8
9

2C Typ 1

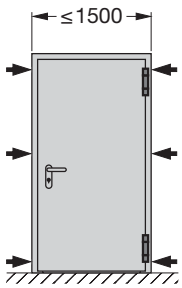




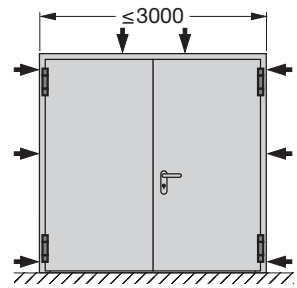
C1.1



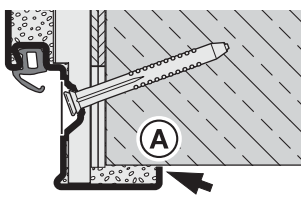
D65 - 1 OD

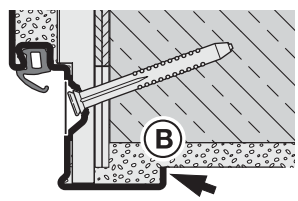


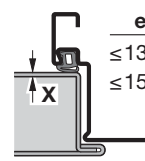
D65 - 2 OD



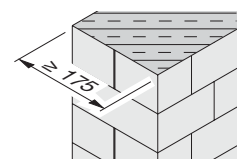
3) Fischer: FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100



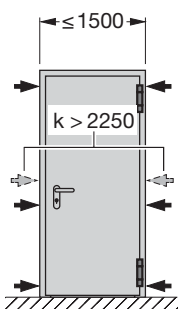




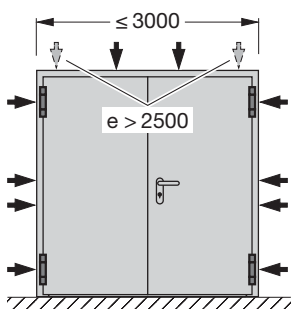
e	X
≤1320	1,0/1,5
≤1500	1,0



H3 - 1 OD



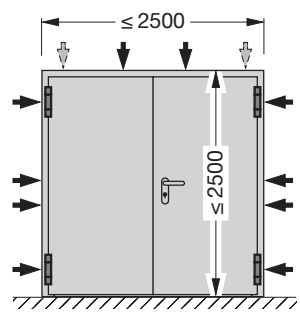
H3 - 2 OD



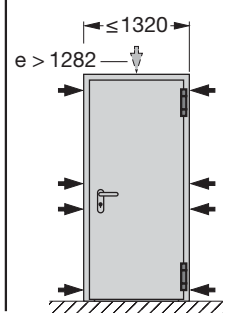
k ≤ 2500 → **3) Fischer:** FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

k > 2500 → **4) Fischer:** FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

H6 - 2 OD
H16 - 2 OD



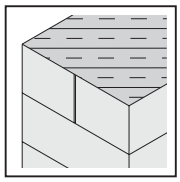
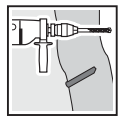
H6 - 1 OD
H16 - 1 OD



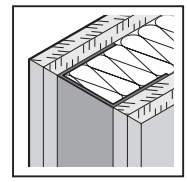
4) Fischer: FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

→ C1.1 - C1.6 1 2 3 …

2C Typ 1

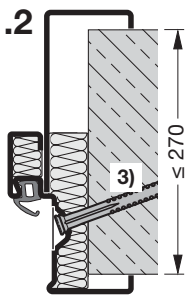



max. T30/EI$_2$30

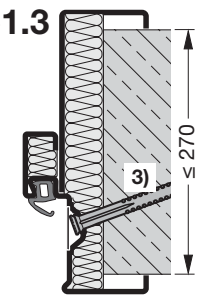


max. T30/EI$_2$30

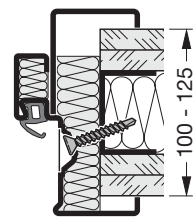
C1.2



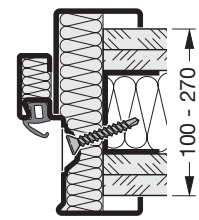
C1.3



C1.4

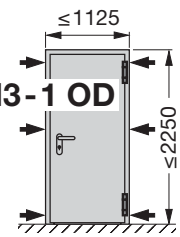


C1.5

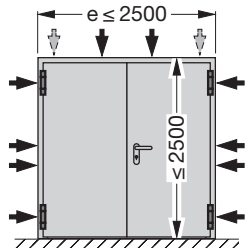


ρ ~ 100 kg/m^3
A (EN 13501-1)
z.B. Isover BSP100

H3-1 OD

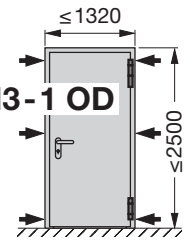


H3-2 OD

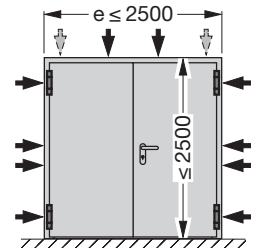


ρ ~ 100 kg/m^3
A (EN 13501-1)
z.B. Isover BSP100

H3-1 OD

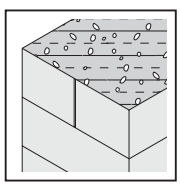
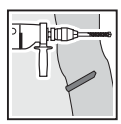


H3-2 OD

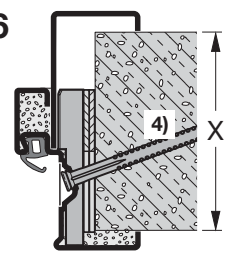


3) **Fischer:** FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

→ C1.1 - C1.6 1 2 3 ...

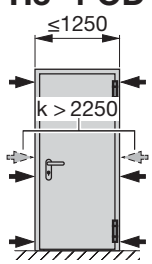
C1.6



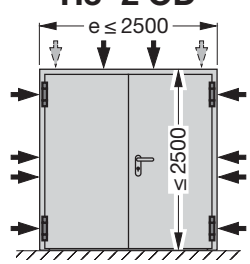
X = 150 - 270 → **max. T30/EI$_2$30**

X = 200 - 270 → **max. T60/EI$_2$60**
→ **max. T90/EI$_2$90**

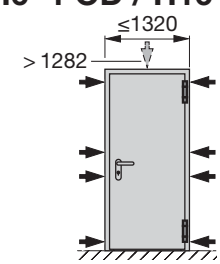
H3-1 OD



H3-2 OD



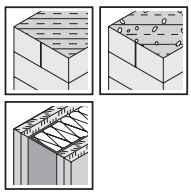
H6-1 OD / H16-1 OD

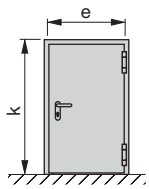


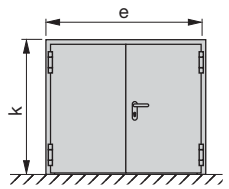
4) **Fischer:** FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

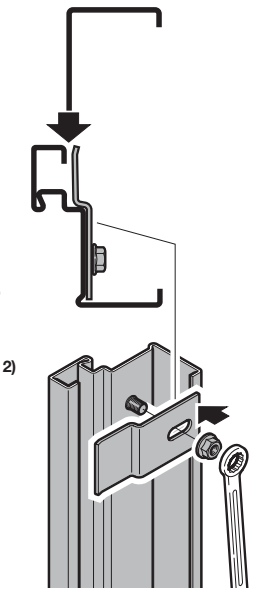
→ C1.1 - C1.6 1 2 3 ...

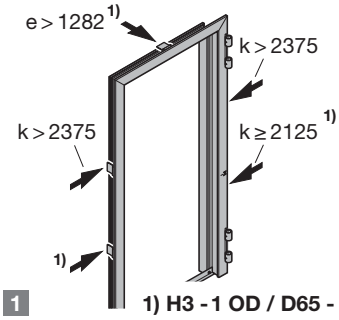
C1.1 - C1.6



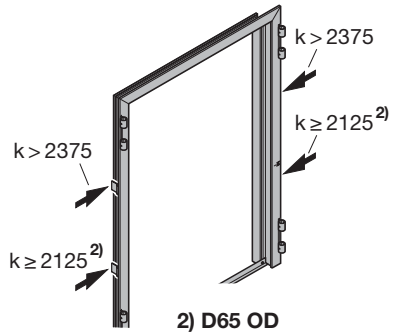




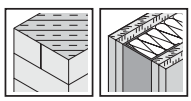




1 **1) H3 -1 OD / D65 - 1 OD**

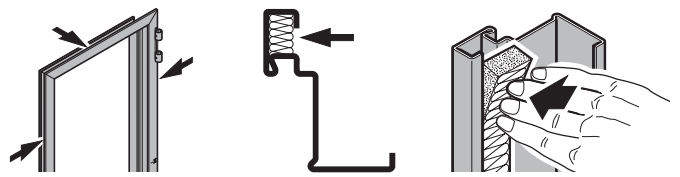


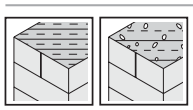
2) D65 OD

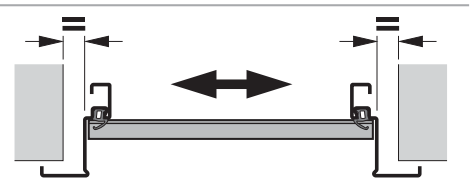


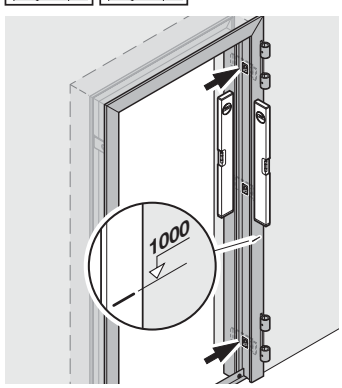
max. T30/EI$_2$30

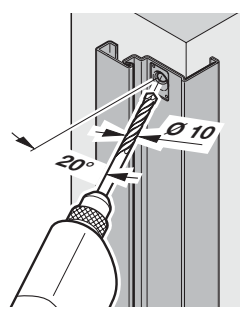
2

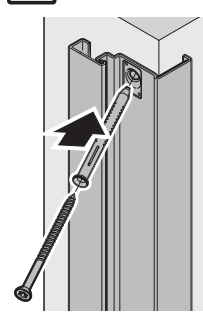


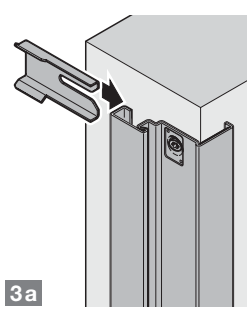


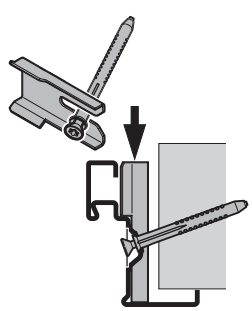


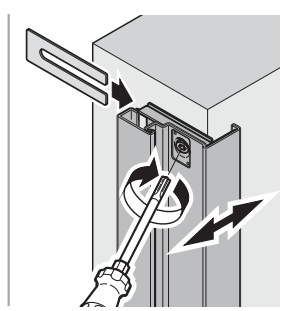


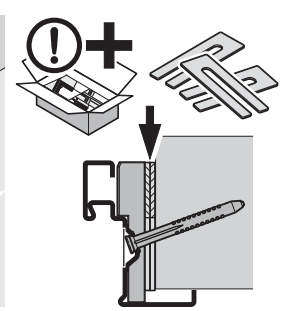












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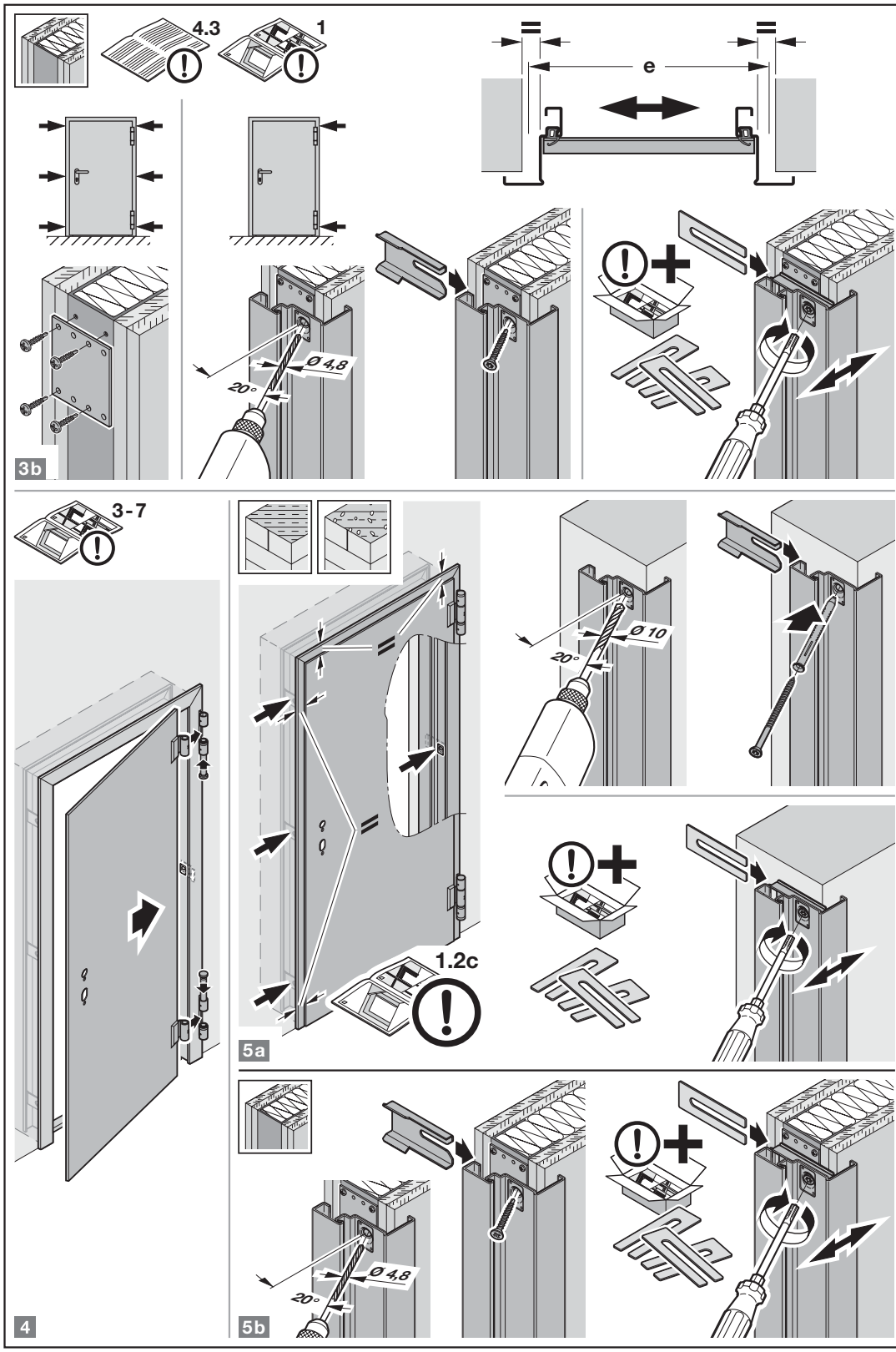
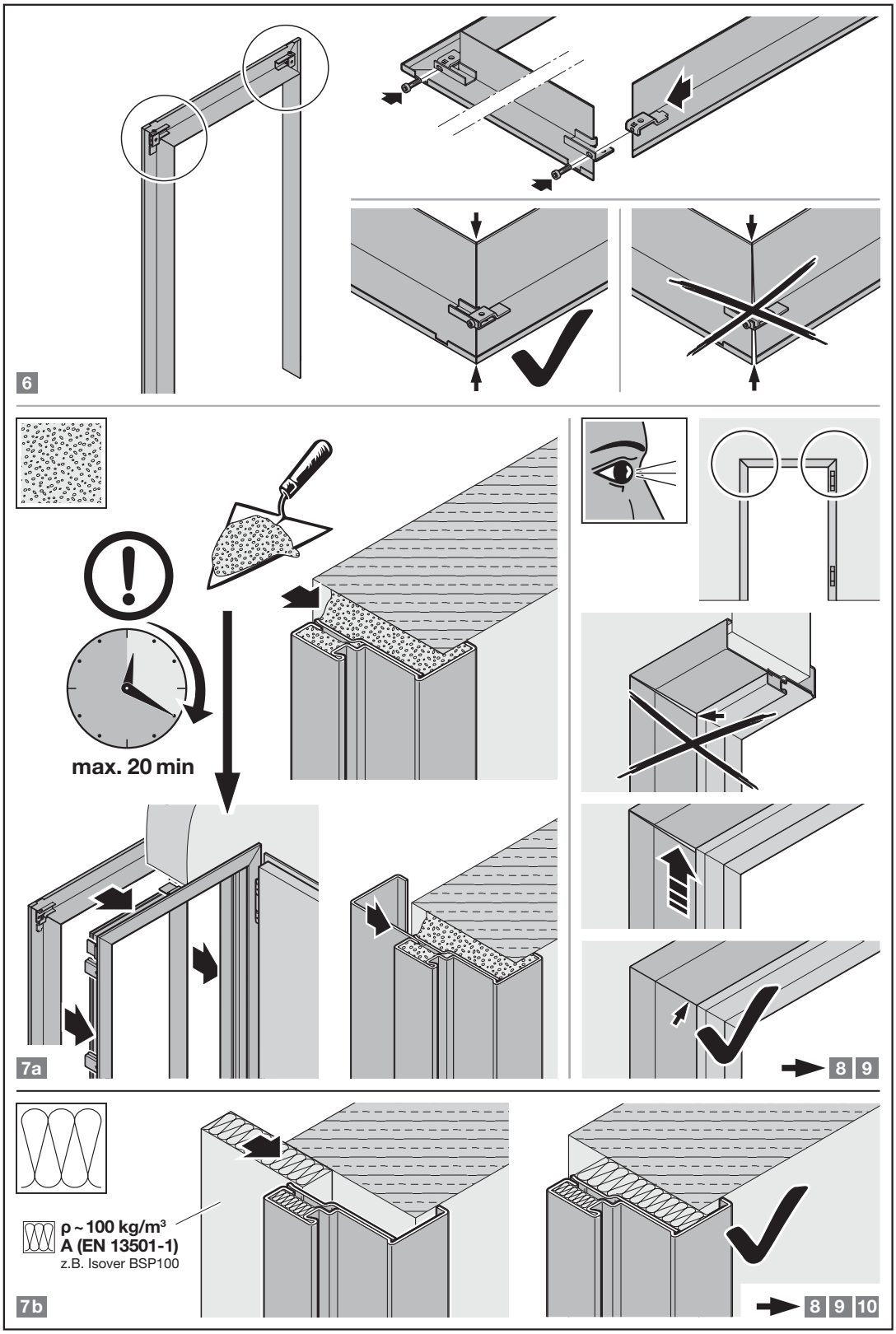
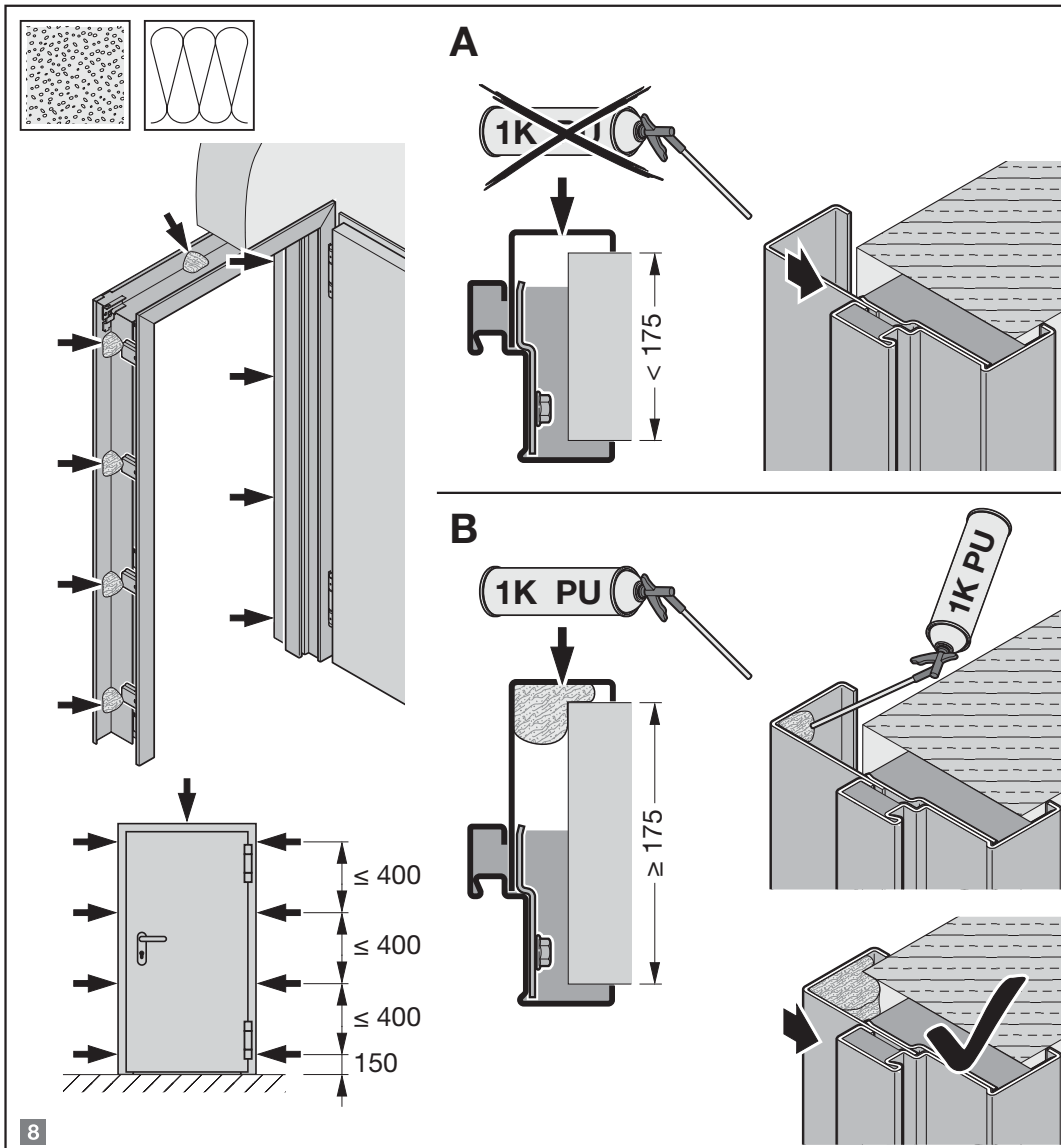
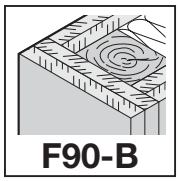

4.3
1
e
Ø 4,8
20°
3b
3-7
Ø 10
20°
1.2c
5a
4
Ø 4,8
20°
5b


6
max. 20 min
7a
8 9
ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100
7b
8 9 10


A
1K
< 175
B
1K PU
1K PU
≥ 175
≤ 400
≤ 400
≤ 400
150
8
9
10a
10b

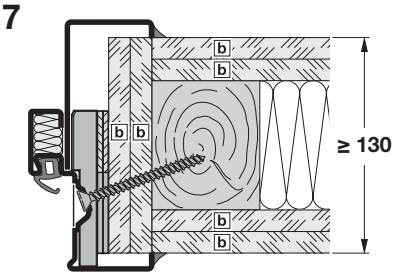
2C Typ 1
max. T30/EI$_2$30



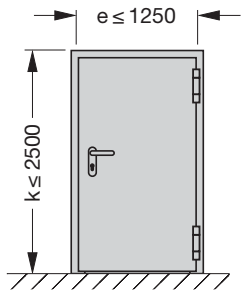
F90-B

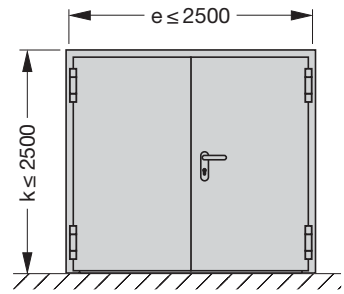
F90-B DIN 4102-4 Tab. 10.3

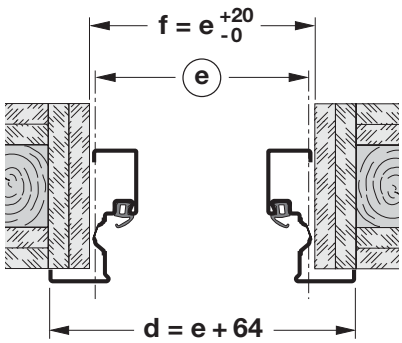
C1.7

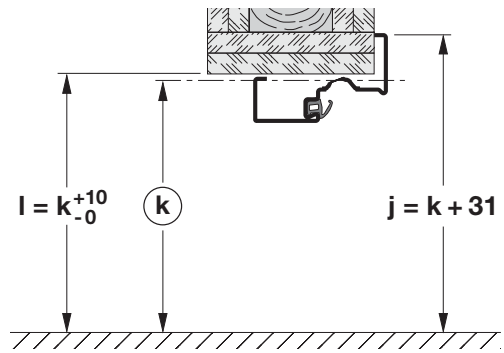


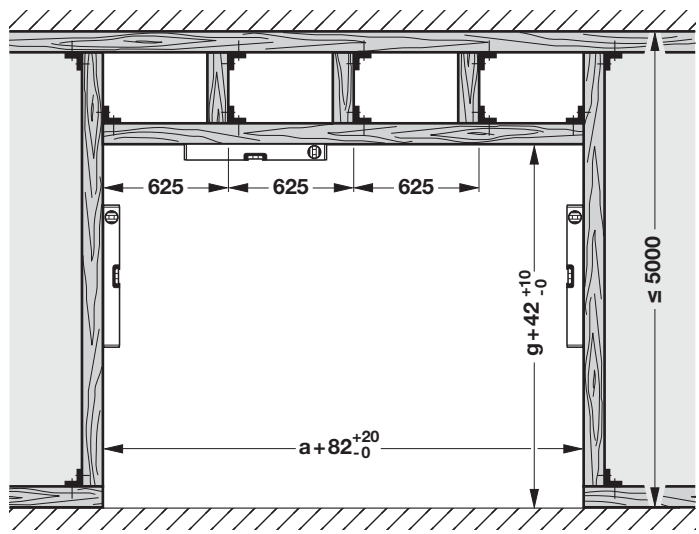
b A-12,5-EN 520











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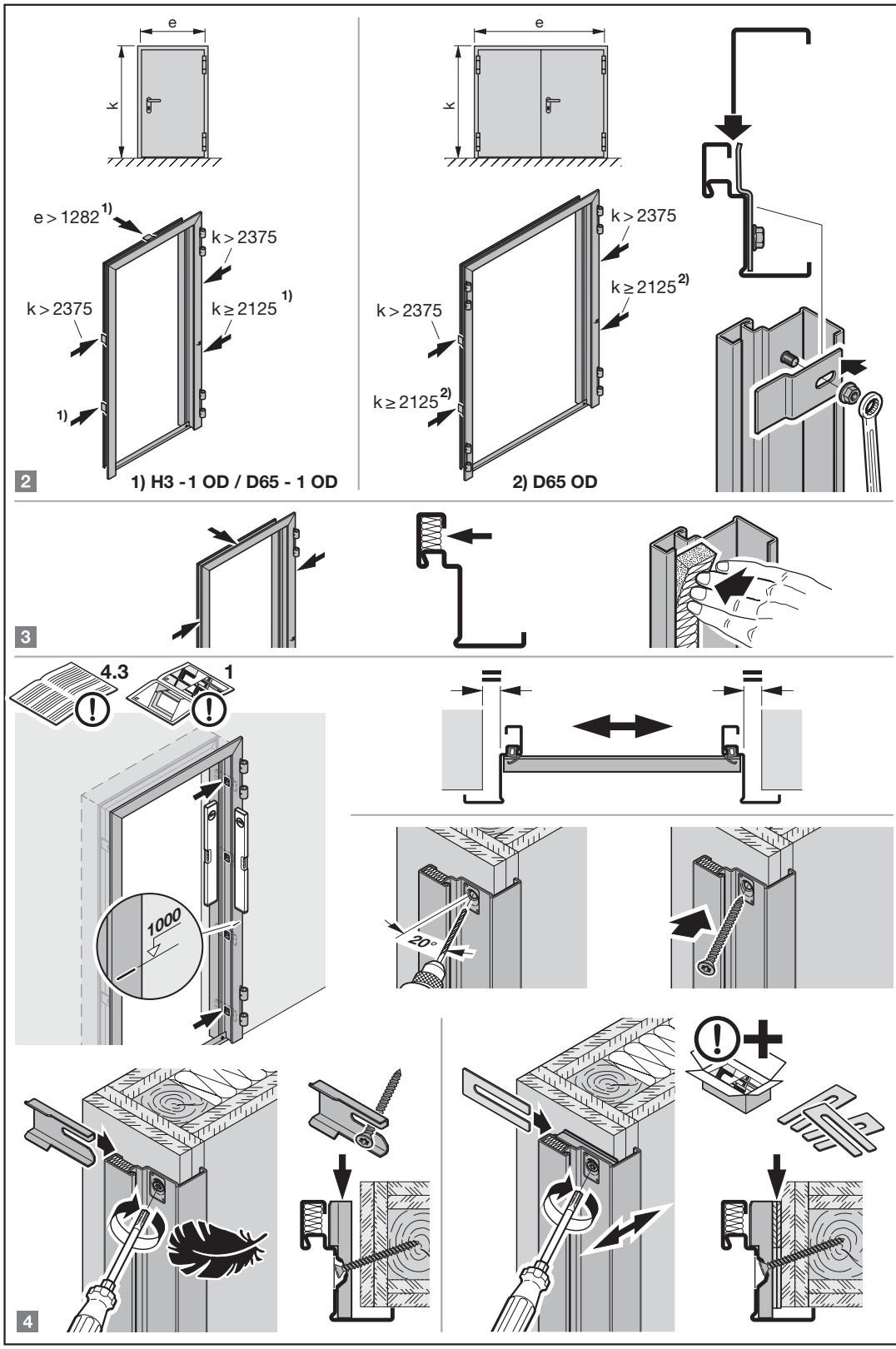
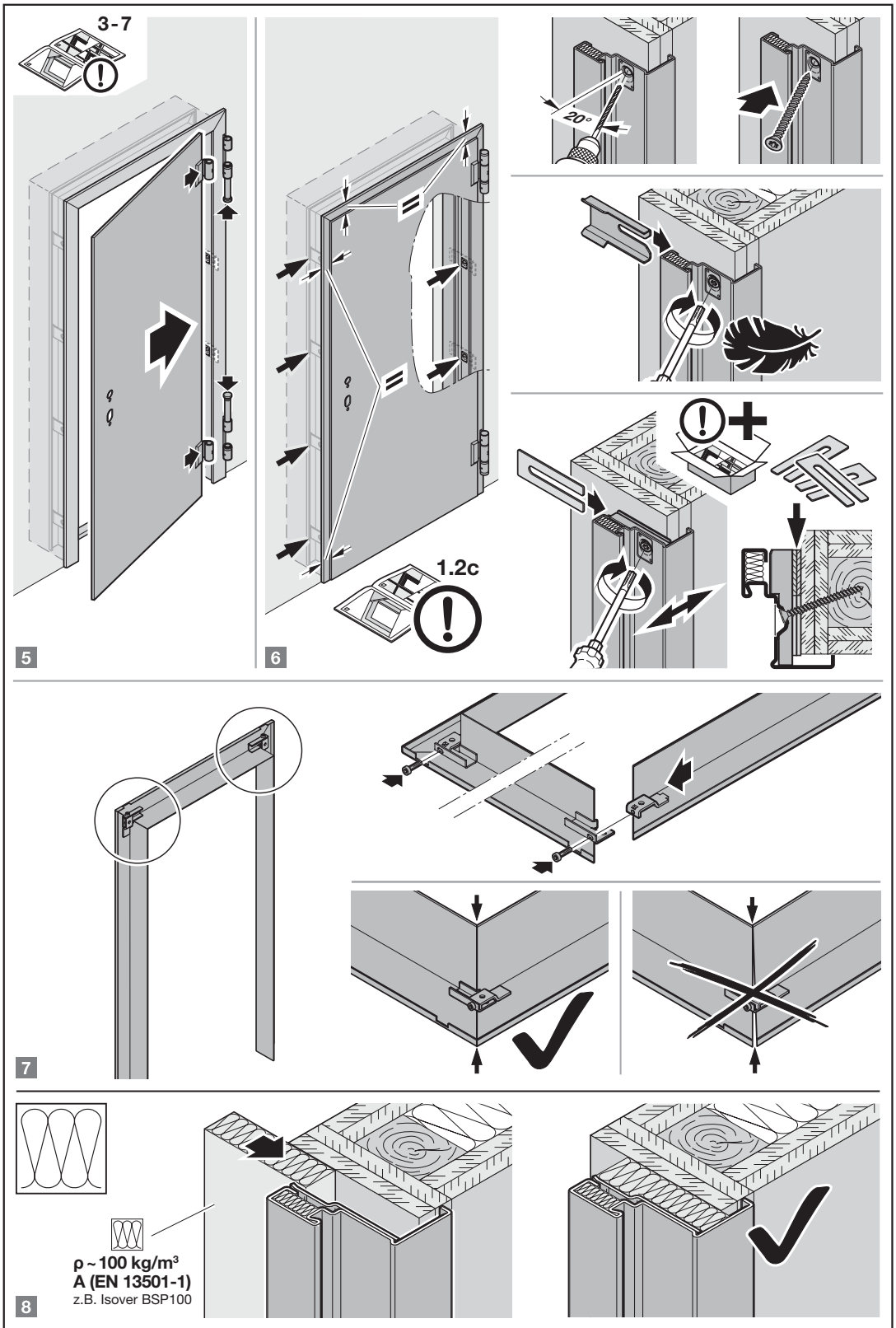
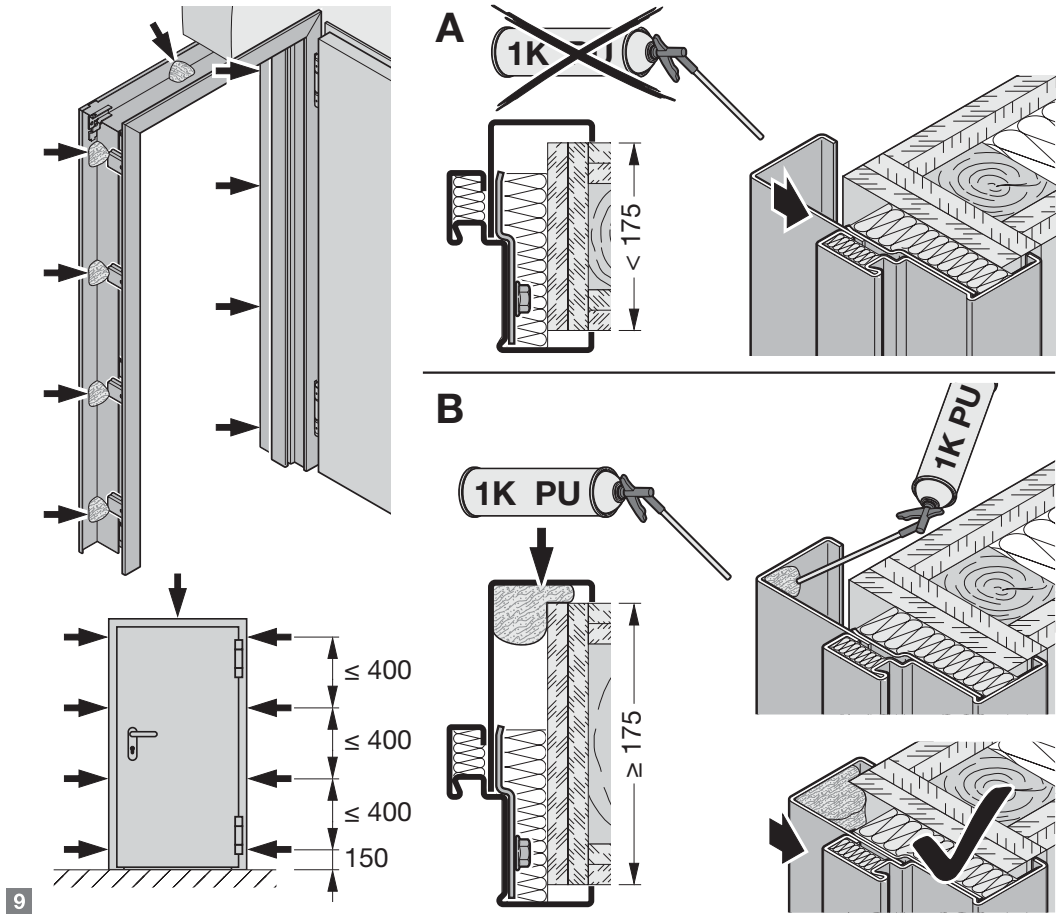
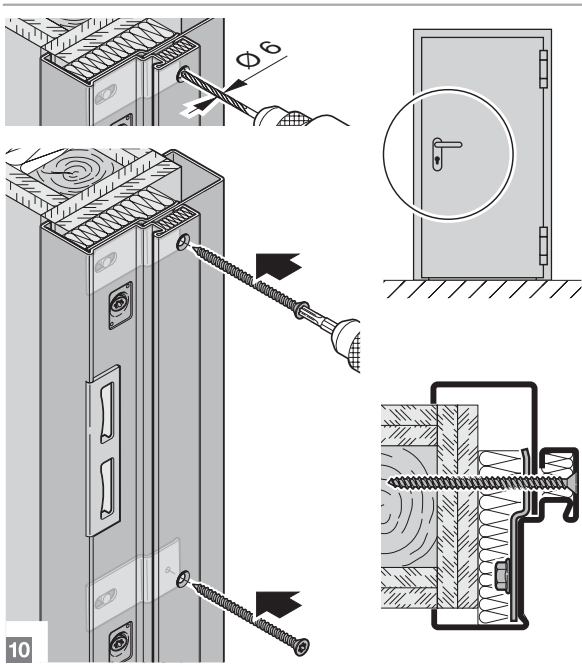
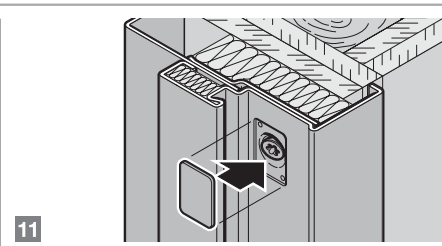

e
k
e > 1282 1)
k > 2375
k > 2375
k ≥ 2125 1)
1)
2
1) H3 -1 OD / D65 - 1 OD
e
k
k > 2375
k ≥ 2125 2)
k > 2375
k ≥ 2125 2)
2) D65 OD
3
4.3
1
1000
20°
4


3-7
20°
1.2c
5
6
7
8
ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100


A
1K
< 175
B
1K PU
1K PU
≥ 175
≤ 400
≤ 400
≤ 400
150
9


Ø6
10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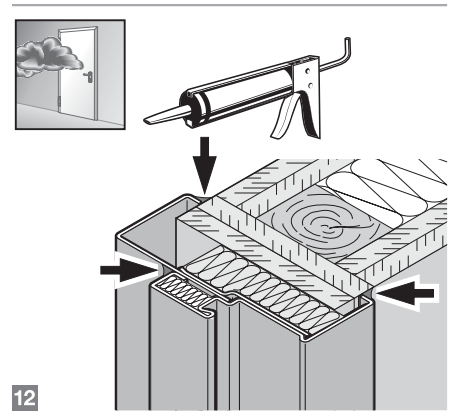
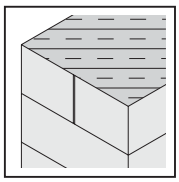
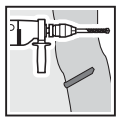
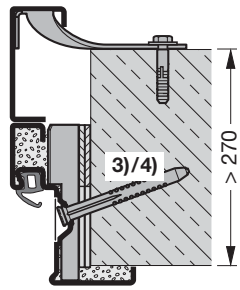

12

2C Typ 2

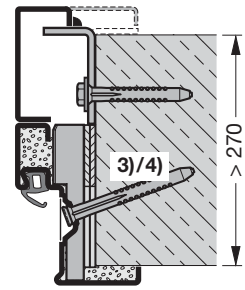




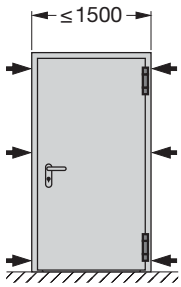
C2.1



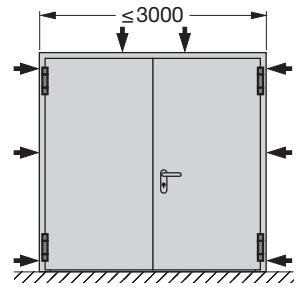
C2.2



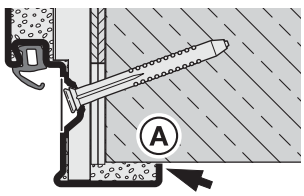
D65 - 1 OD

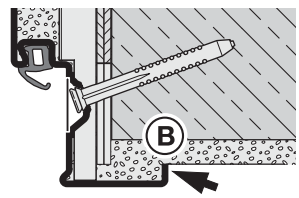


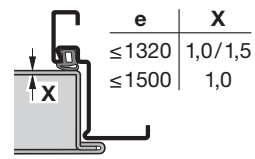
D65 - 2 OD

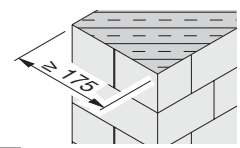


3) Fischer: FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

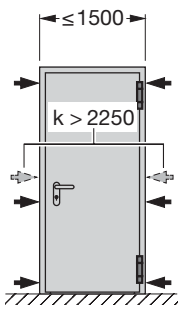




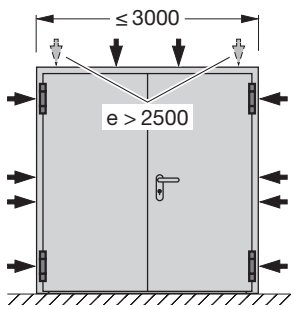




H3 - 1 OD



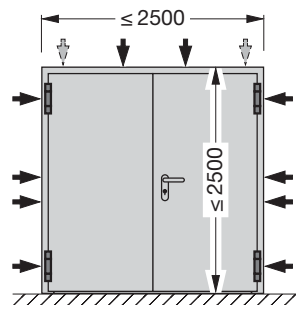
H3 - 2 OD



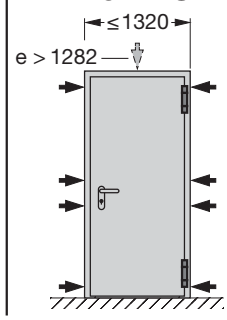
k ≤ 2500 ➡ **3) Fischer:** FUR 10 × 100
Fischer: DuoXpand 10 × 100
CELO: HBR 10 × 100

k > 2500 ➡ **4) Fischer:** FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

H6 - 2 OD
H16 - 2 OD



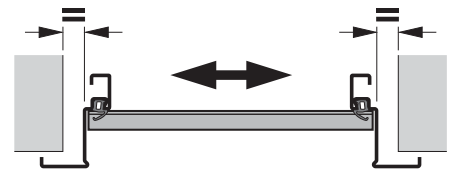
H6 - 1 OD
H16 - 1 OD

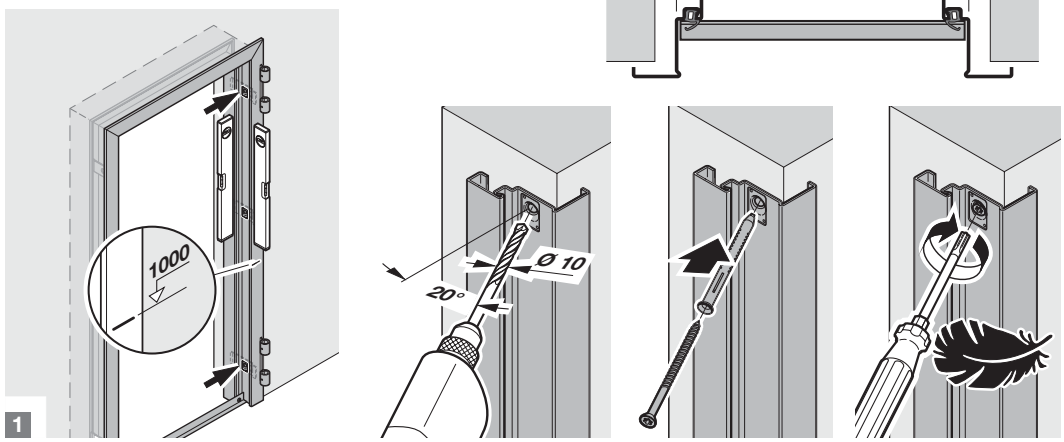


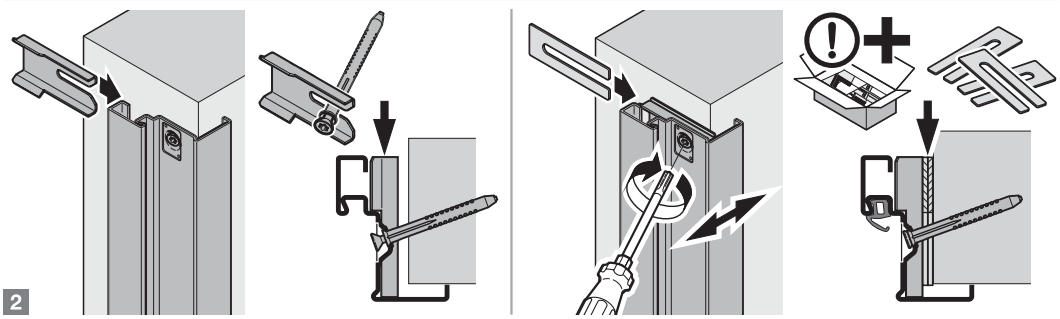
4) Fischer: FUR 10 × 160
Fischer: DuoXpand 10 × 160
CELO: HBR 10 × 160

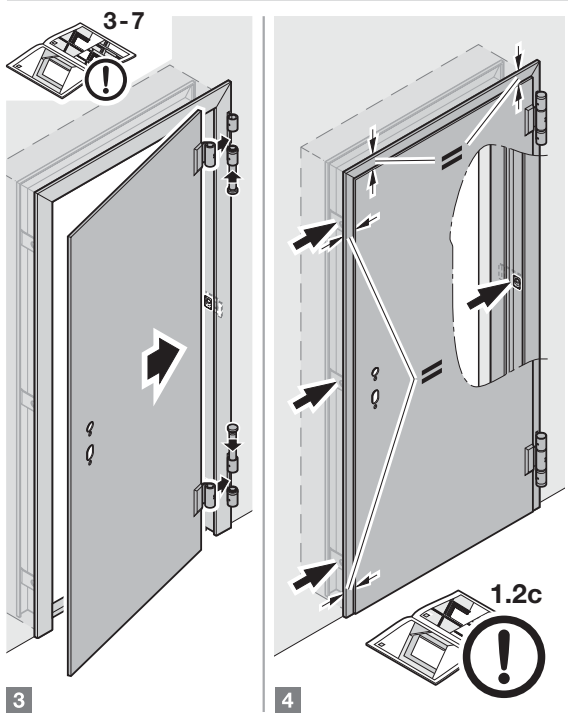
➡ **C2.1 / C2.2** 1 2 3 …

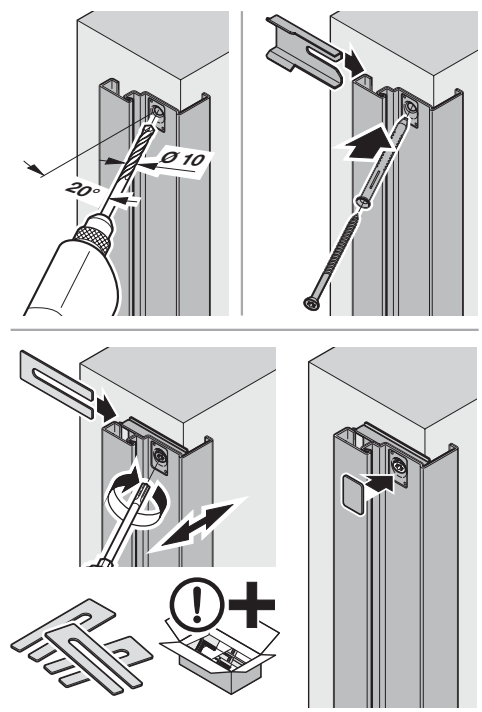
C2.1 / C2.2

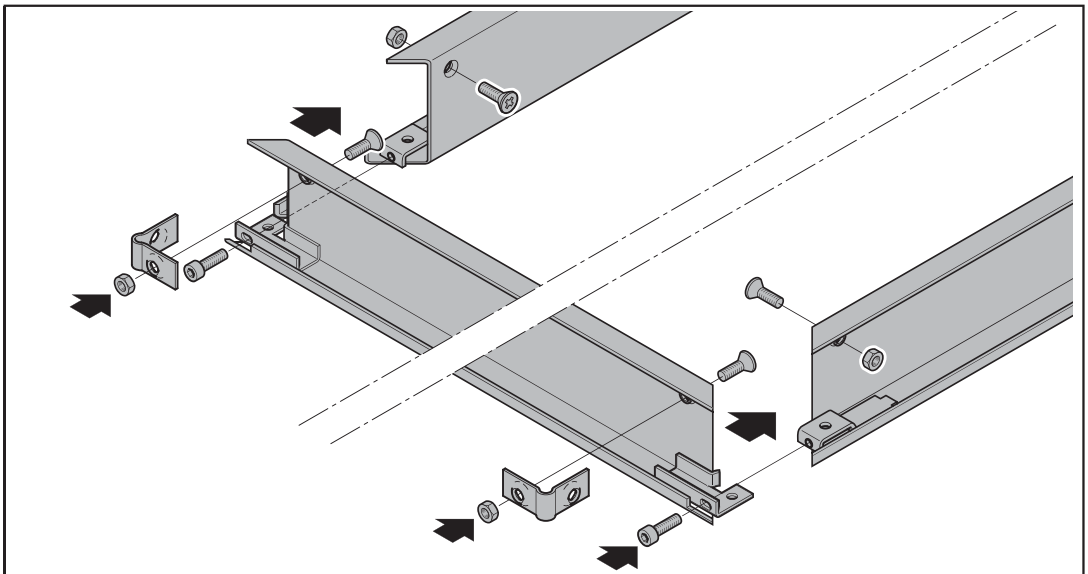


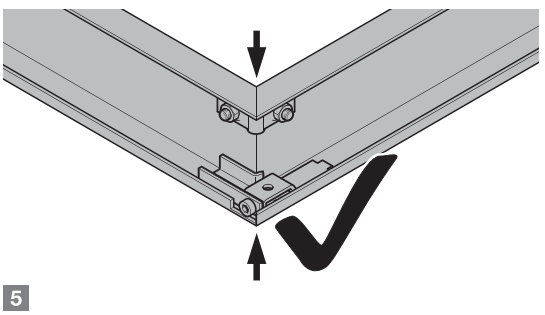


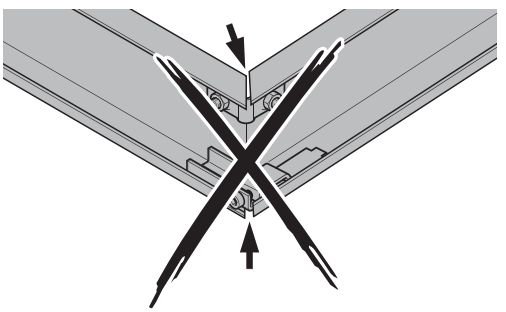












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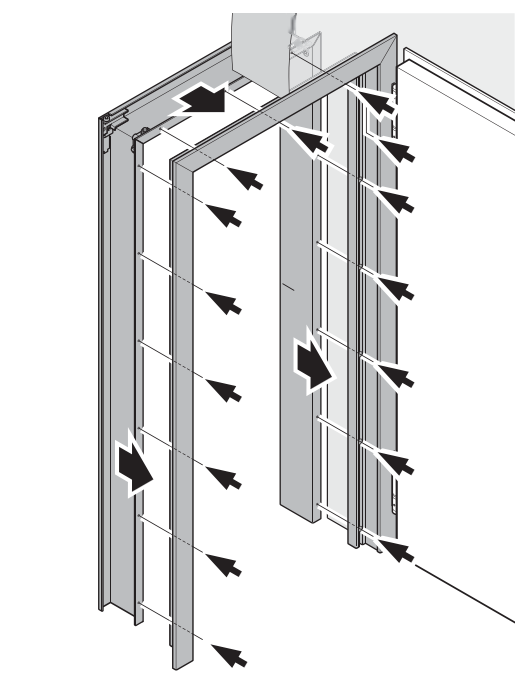
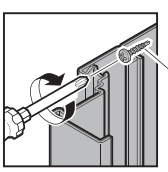
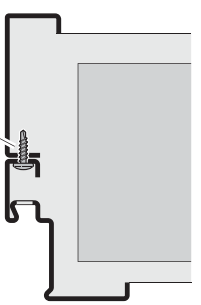


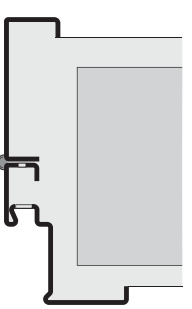


DIN 7504 ST 4,8 × 19-N-H
DIN 7981 4,8 × 16



6a

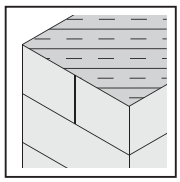
2√× >10

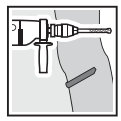


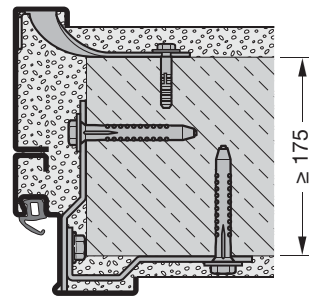
6b

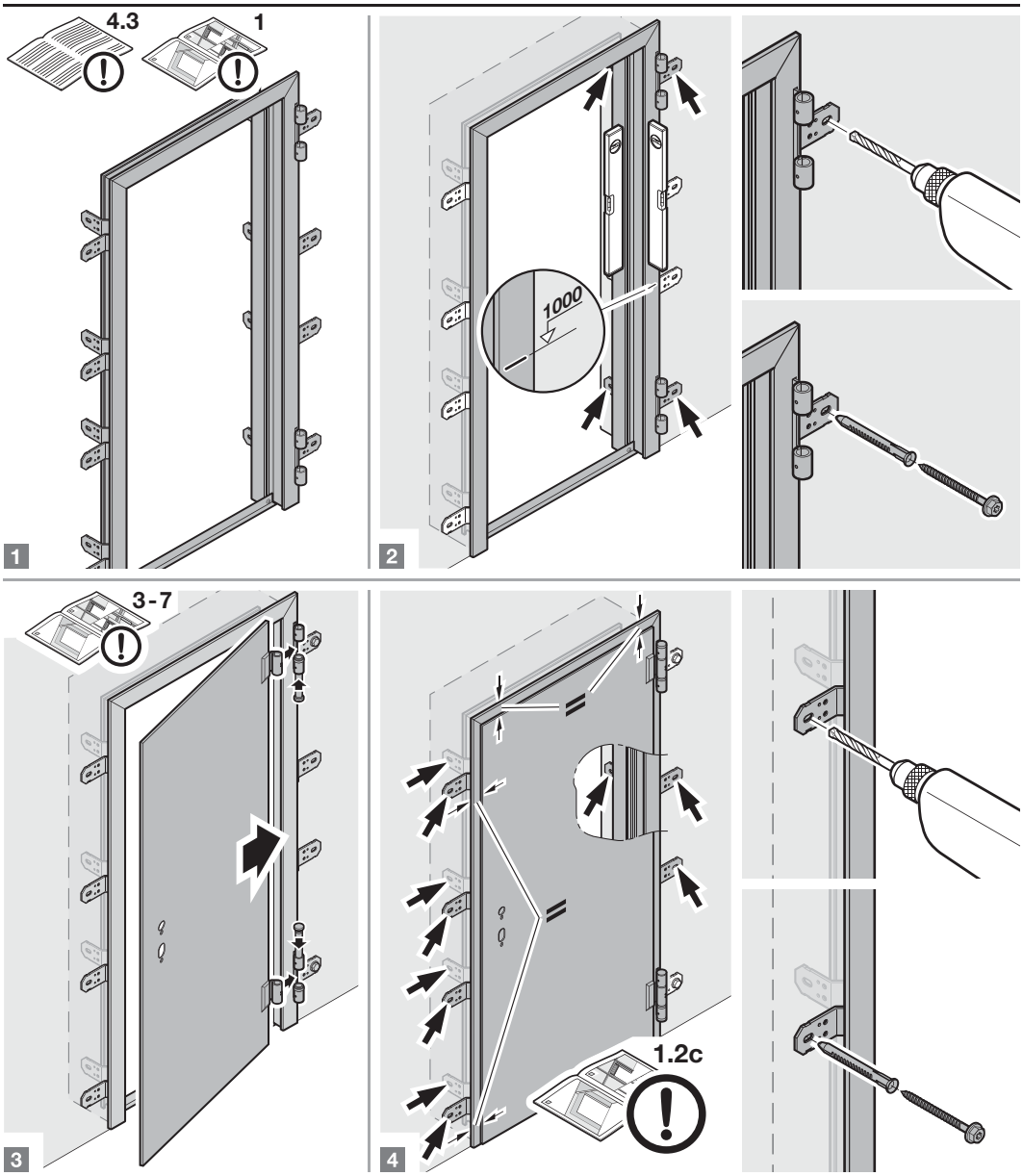
2C Typ 3

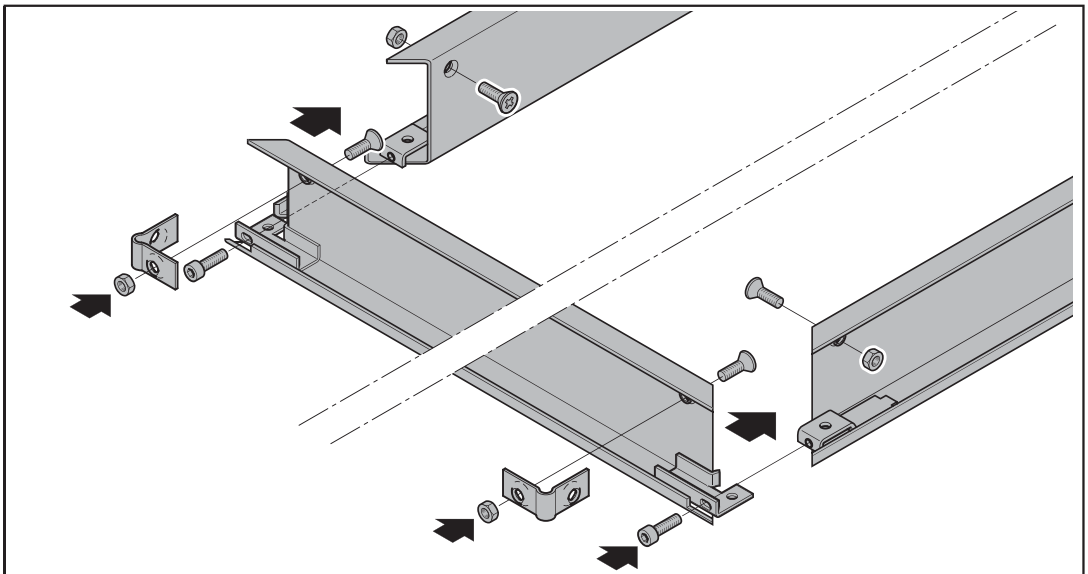
C3.1

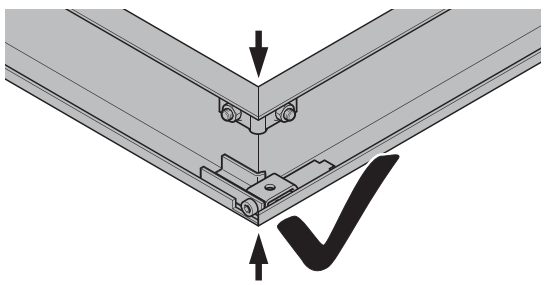


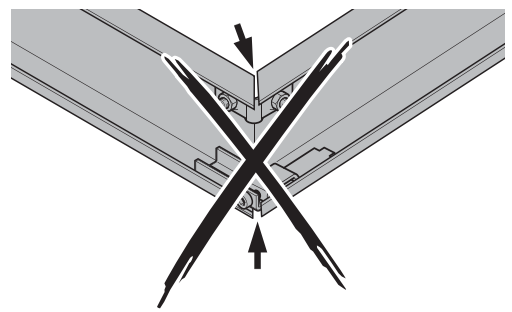












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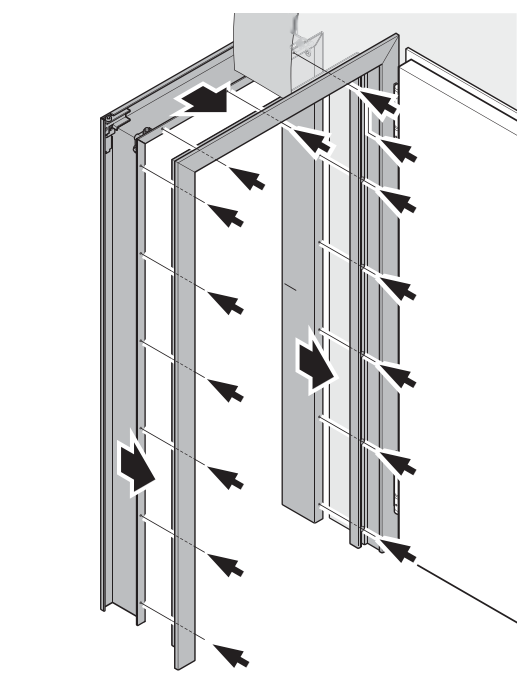

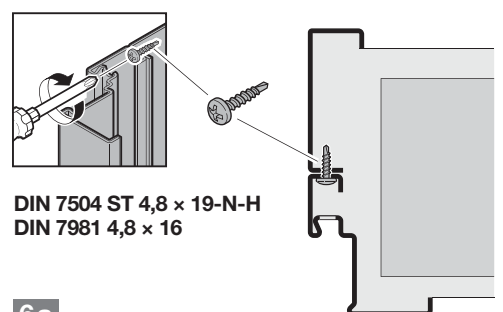

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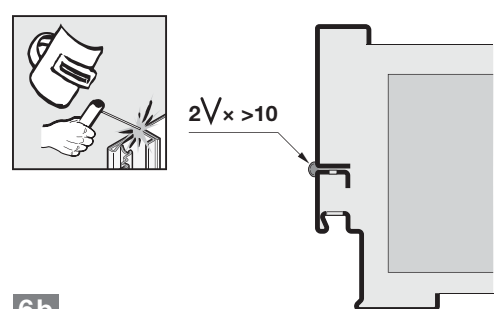

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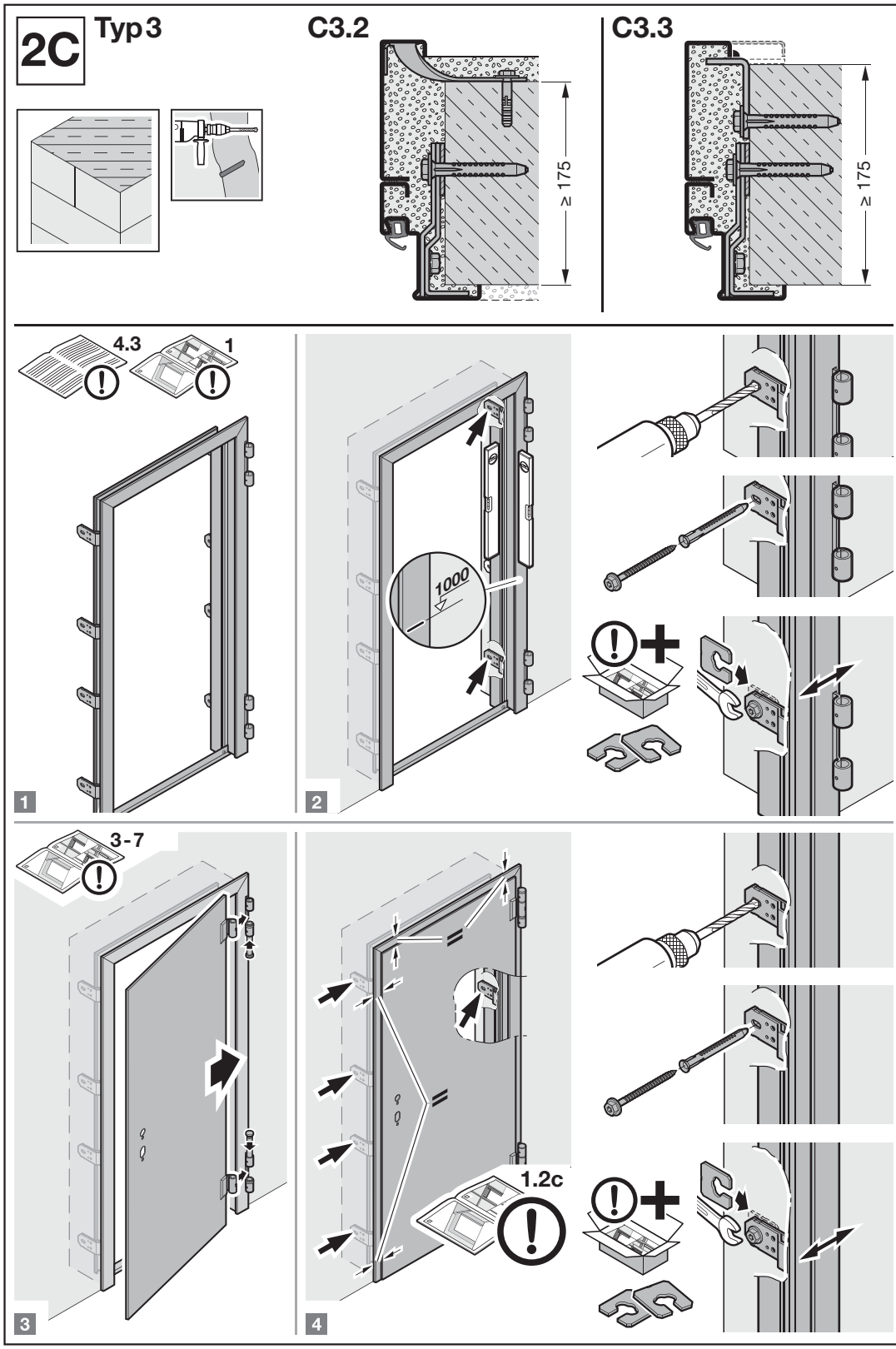
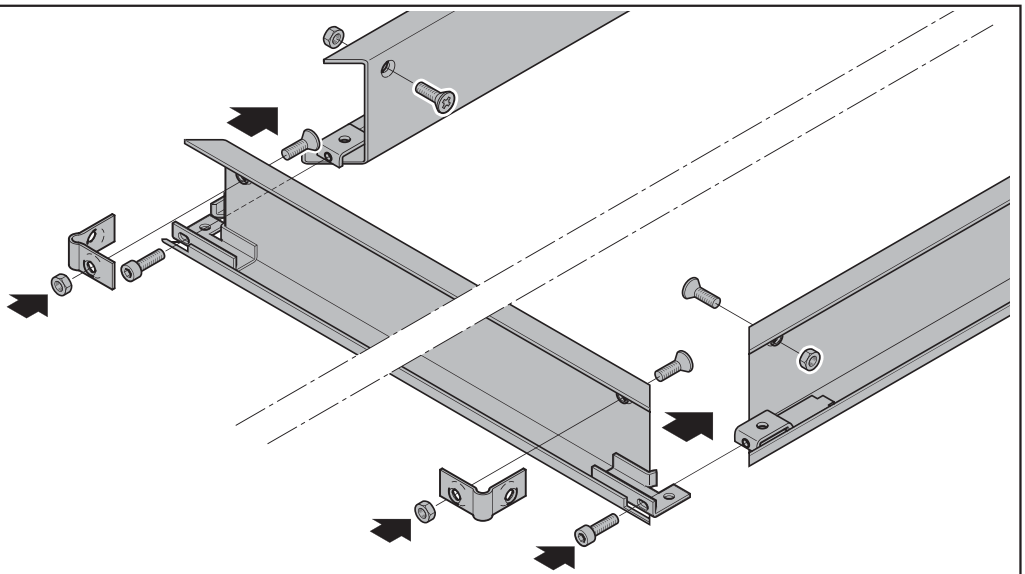
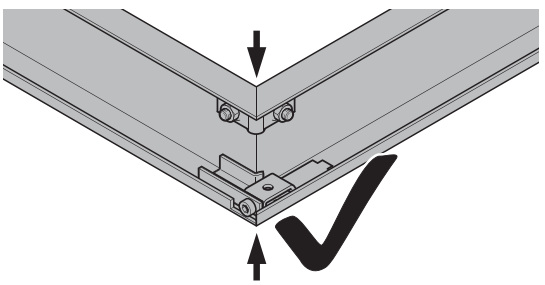
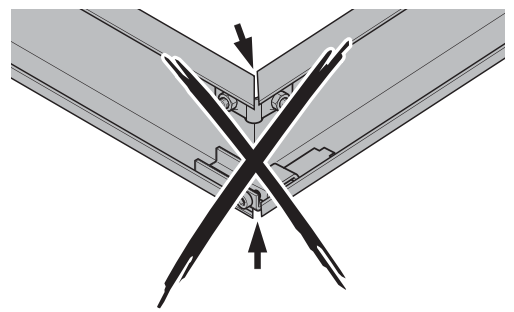

2C
Typ 3
C3.2
C3.3
≥ 175
≥ 175
4.3
1
1000
1
2
3-7
1.2c
3
4







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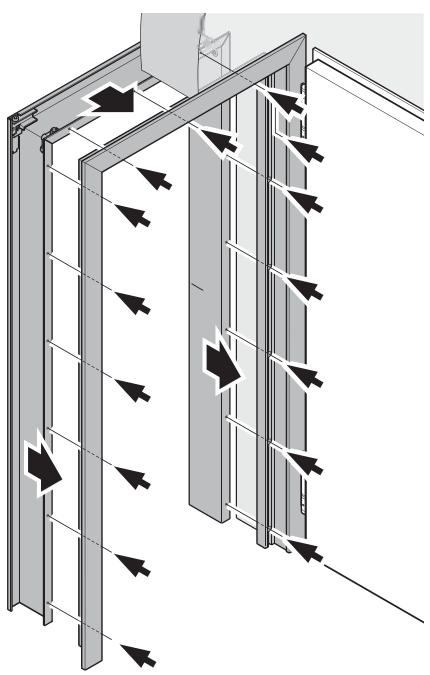

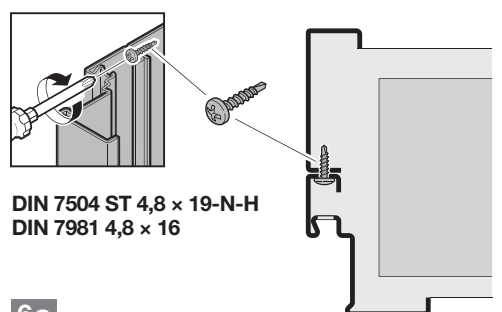

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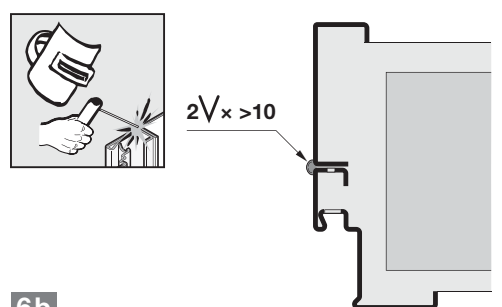
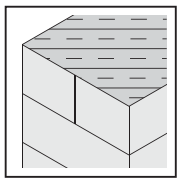
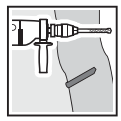


6b

2C **Typ 3**
max. T30

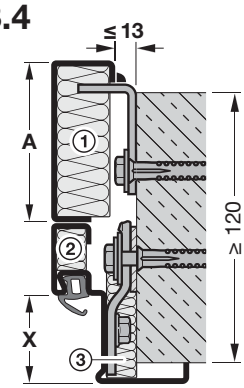


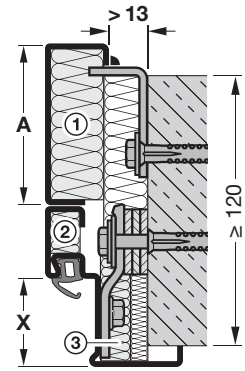


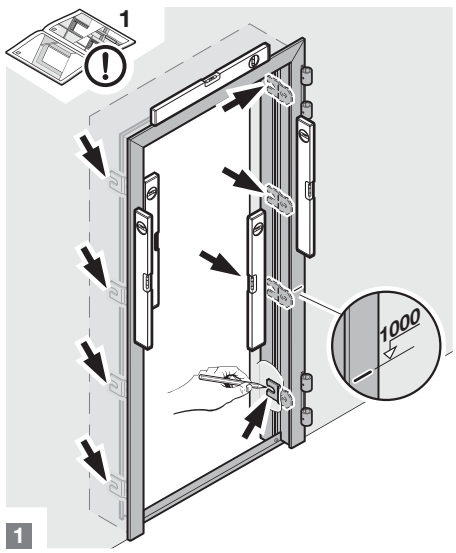
ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100

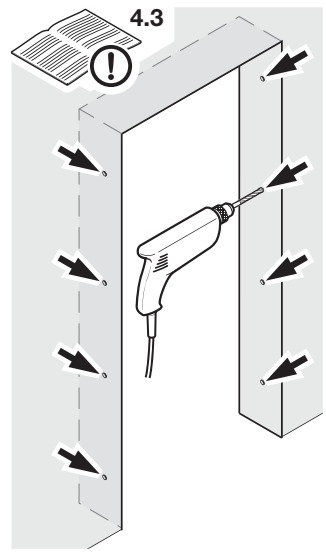
① = 30 × (**A** - 5)
② = 15 × 22,5
③ = 15 × (**X** + 24)

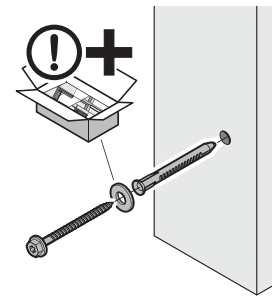
C3.4

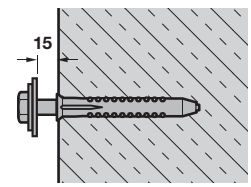


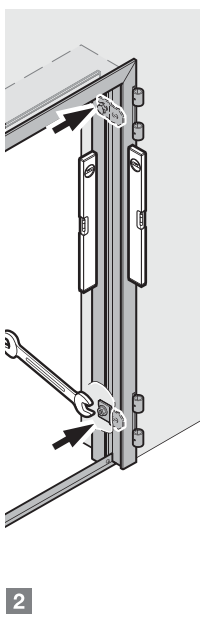


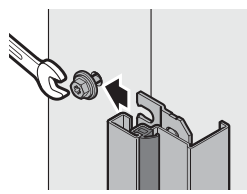


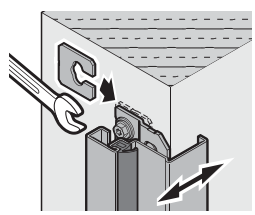


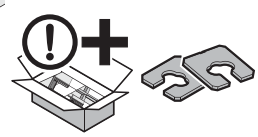


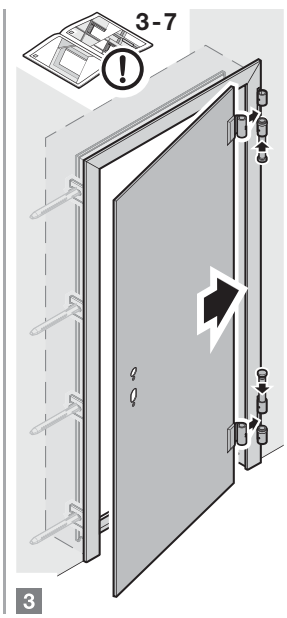


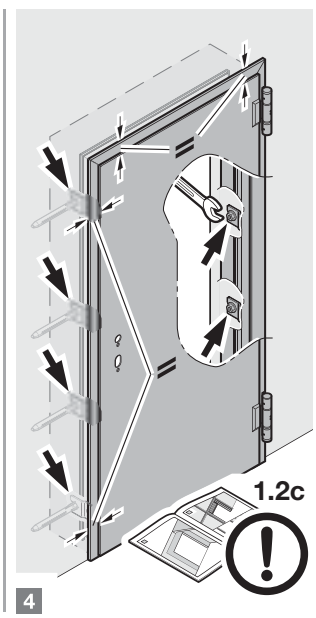


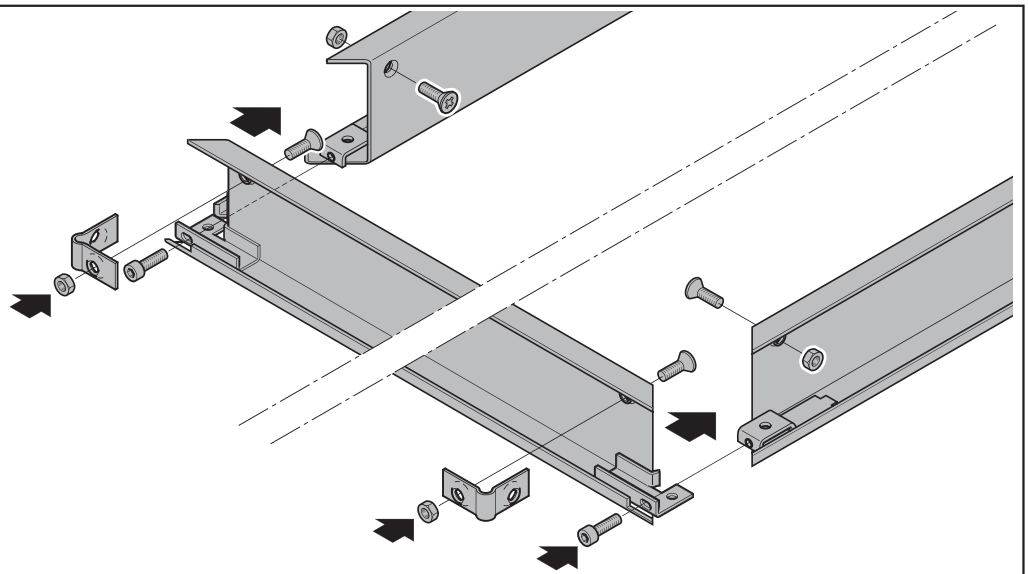


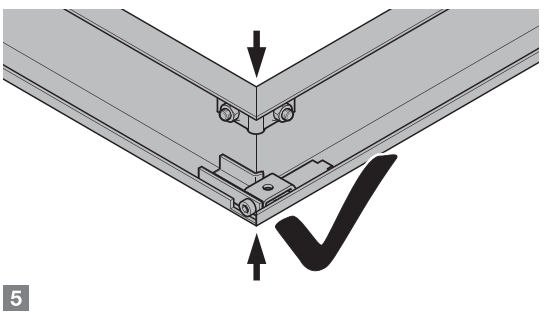


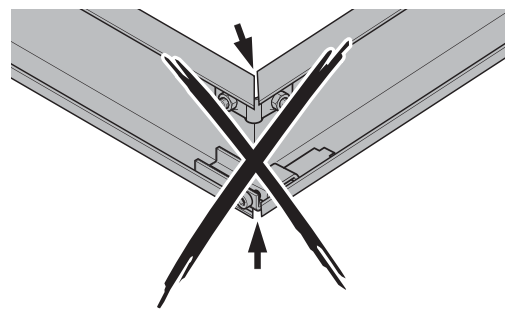












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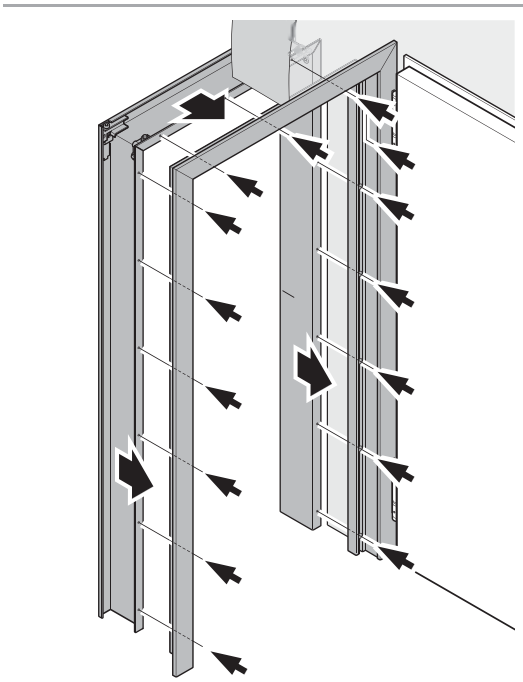

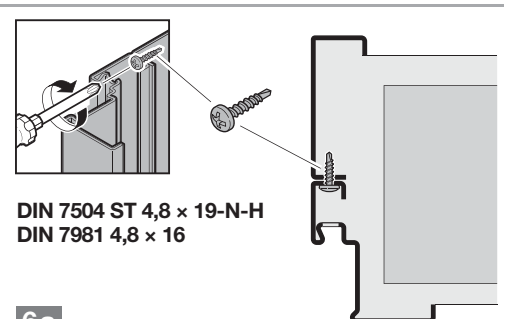

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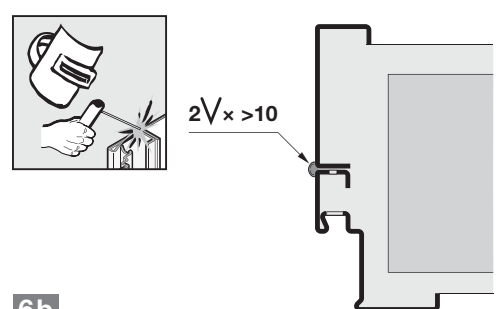
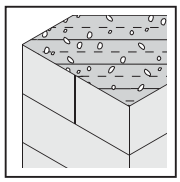
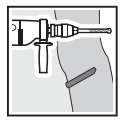


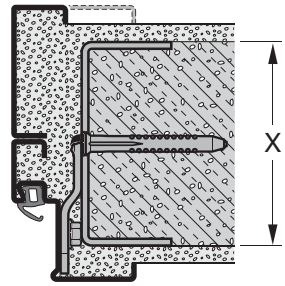
6b

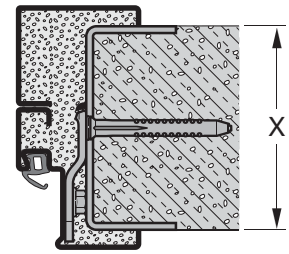
2C Typ 3

C3.5



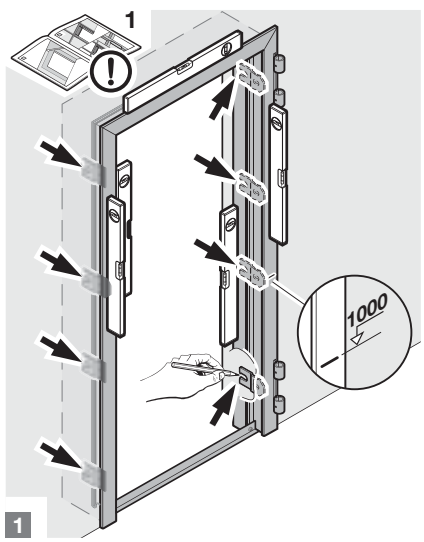


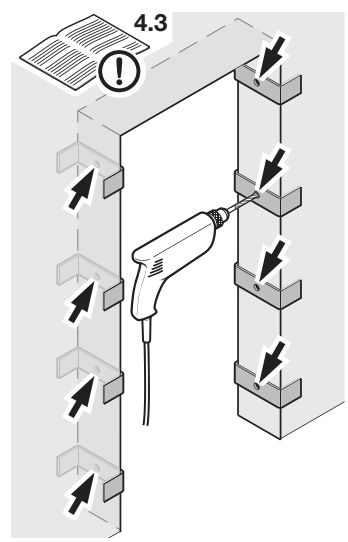


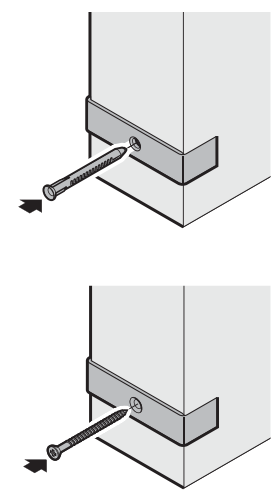


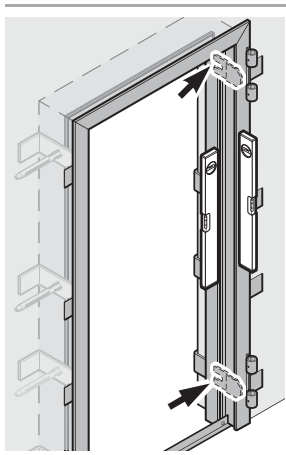
X ≥ 150 ➡ **max. T30/EI$_2$30** X ≥ 175 ➡ **max. T60/EI$_2$60**

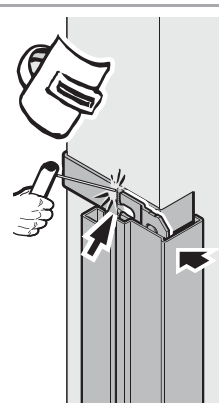
➡ **max. T90/EI$_2$90**

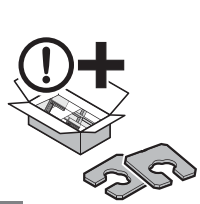


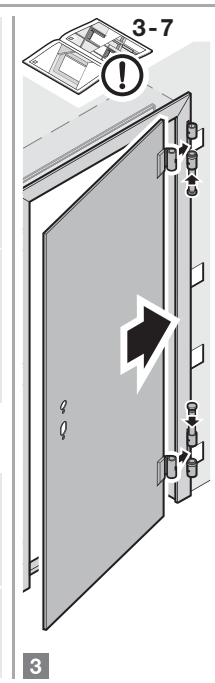


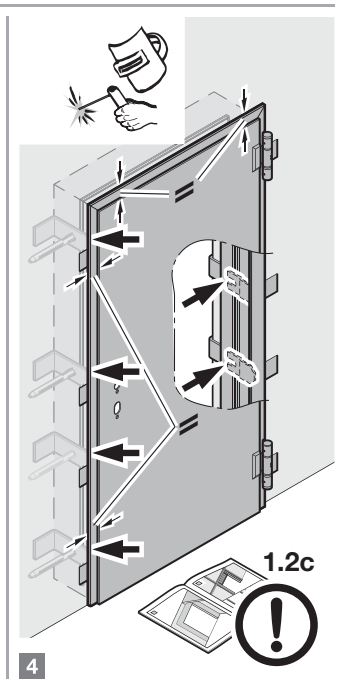


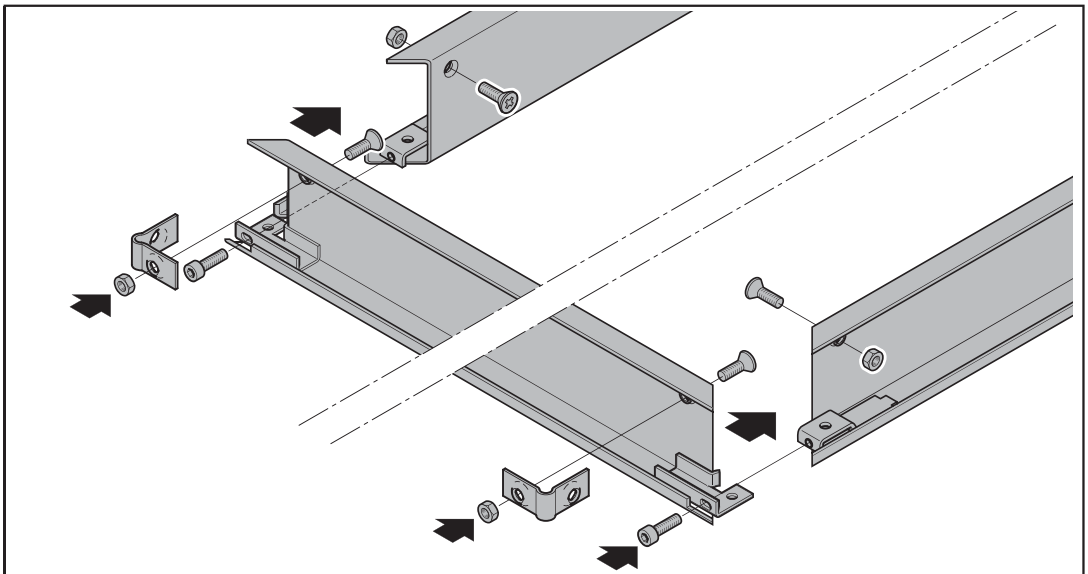


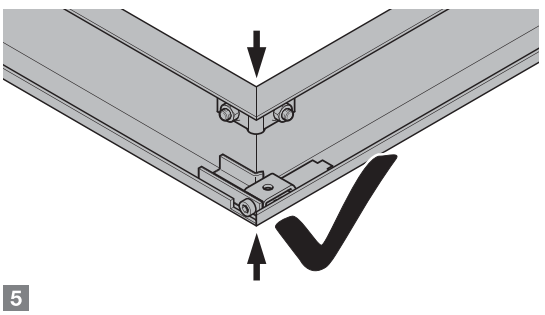


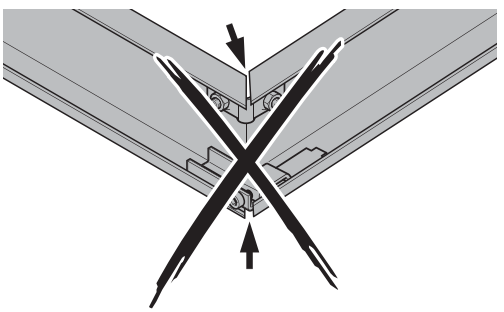












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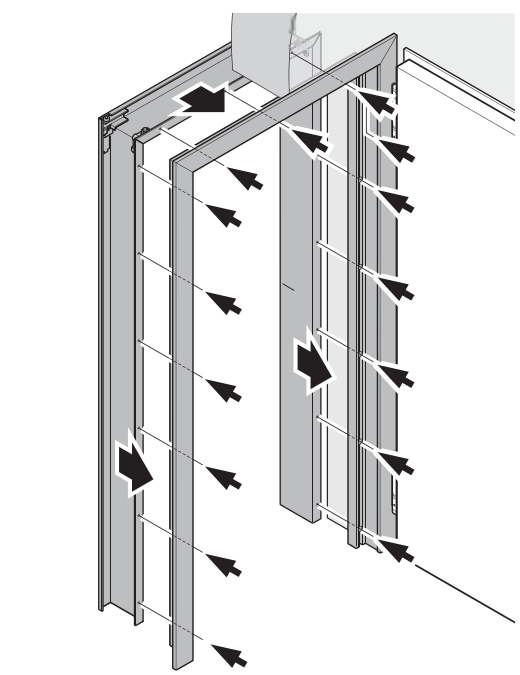
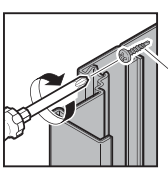
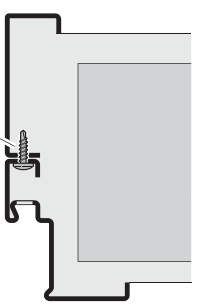


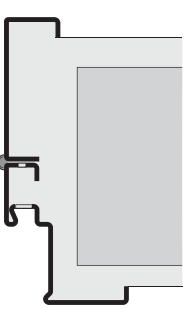


DIN 7504 ST 4,8 × 19-N-H
DIN 7981 4,8 × 16



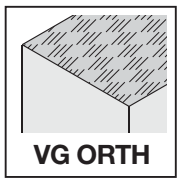
6a

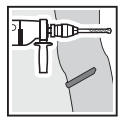
2√× >10



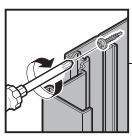
6b

2C Typ 3
max. T30



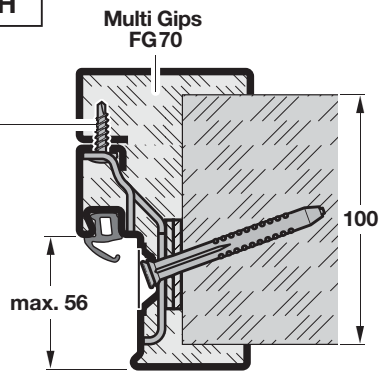


C3.6

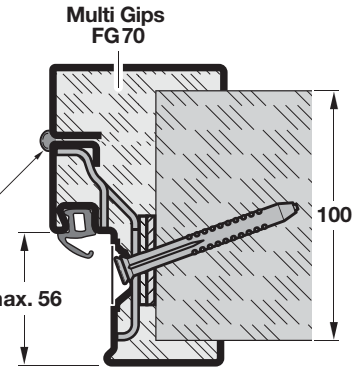


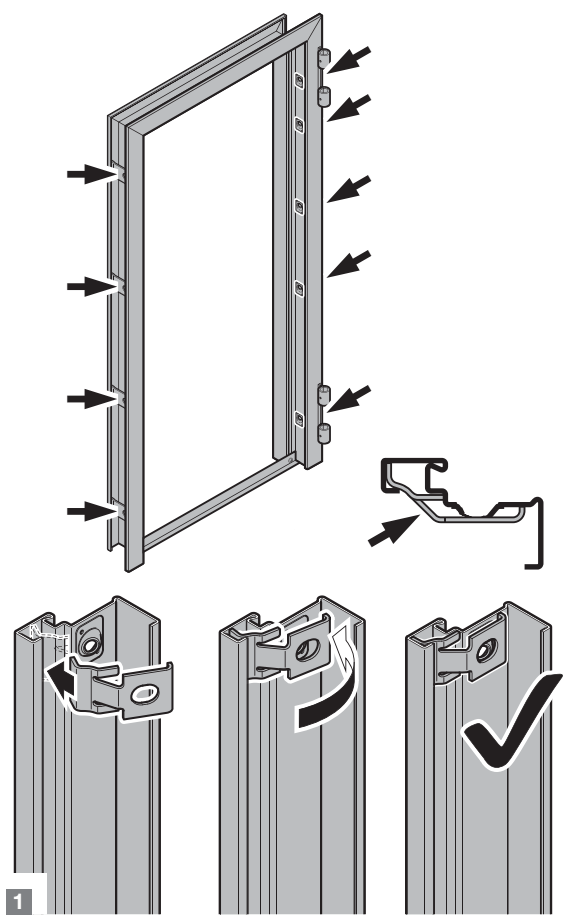
DIN 7504 ST
4,8 × 19-N-H

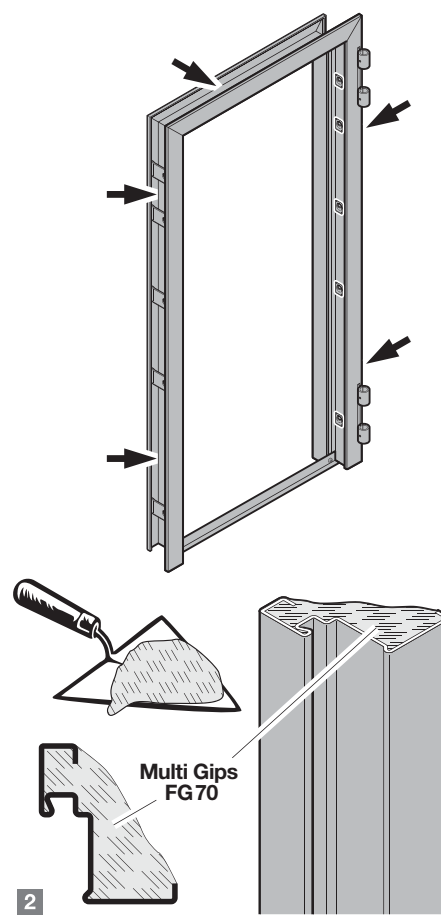
DIN 7981
4,8 × 16

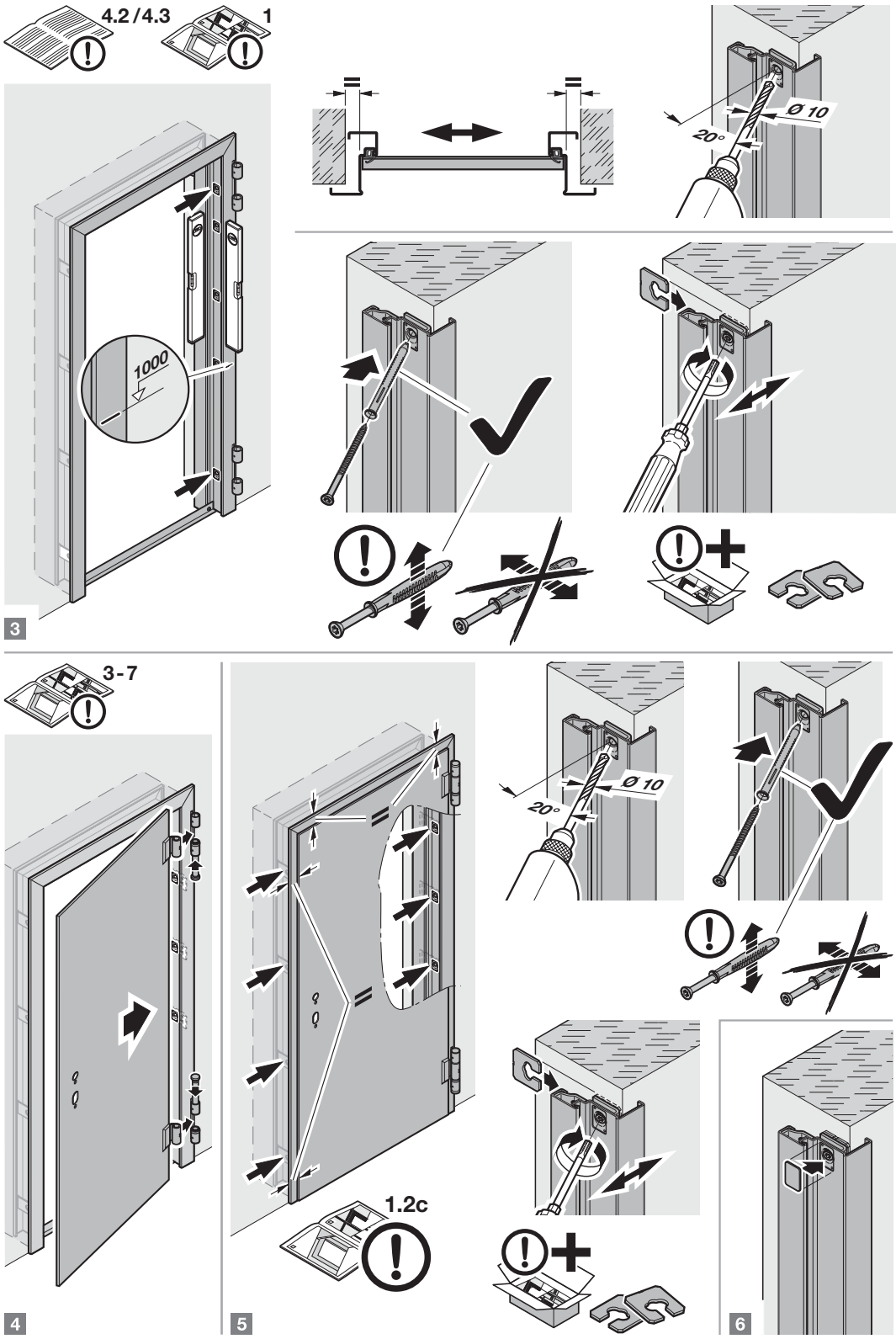


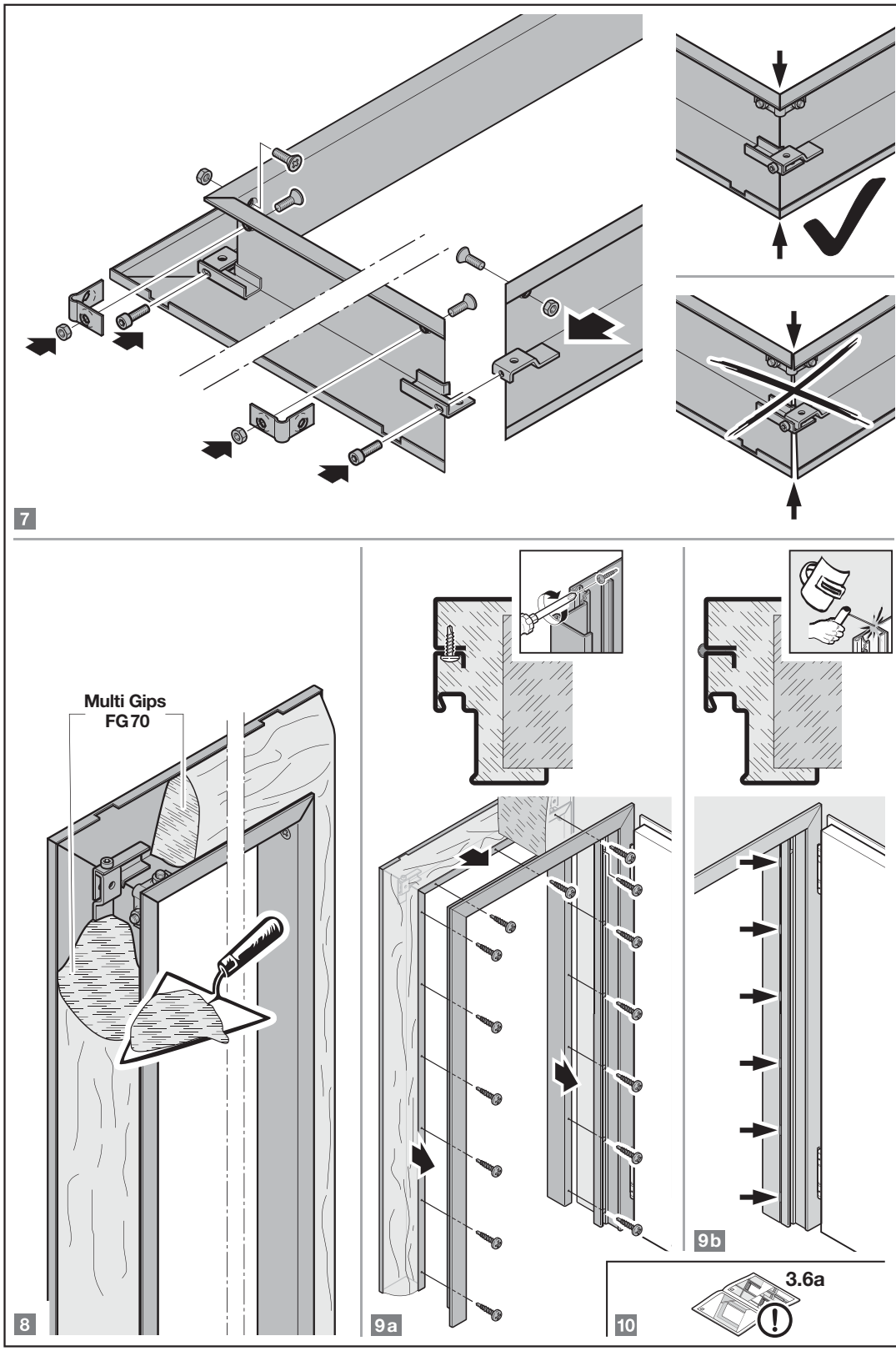
2√× >10



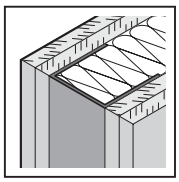




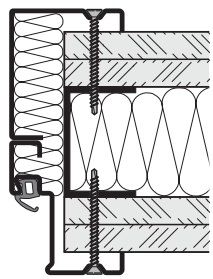

4.2 / 4.3
1
1000
Ø 10
20°
3
3 - 7
Ø 10
20°
1.2c
4
5
6

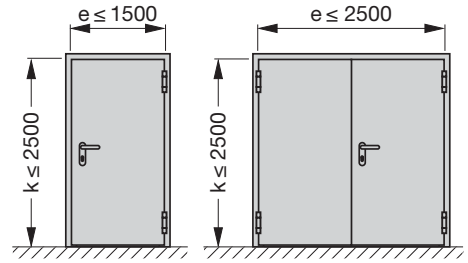

7
Multi Gips
FG70
8
9a
9b
10
3.6a

2C Typ 4

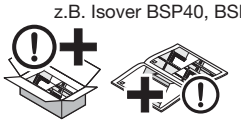


C4.1
max. T30/EI$_2$30

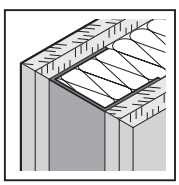


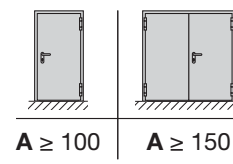


ρ ≥ 40 kg/m³
A (EN 13501-1)
z.B. Isover BSP40, BSP100

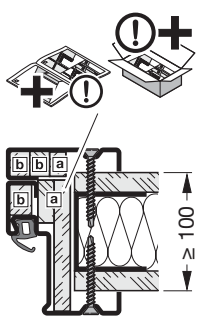


→ C4.1 - C4.4 1 2 3 ...

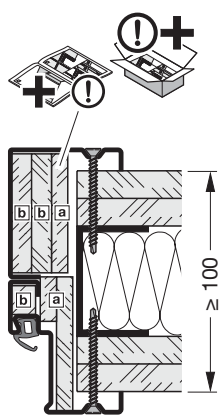




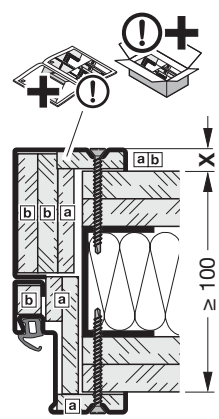
C4.2
T30/EI$_2$30



C4.3
T30/EI$_2$30

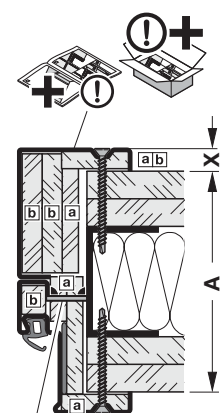


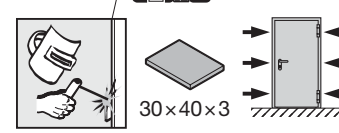
C4.4
T60/EI$_2$60



X a = 10
X b = 15

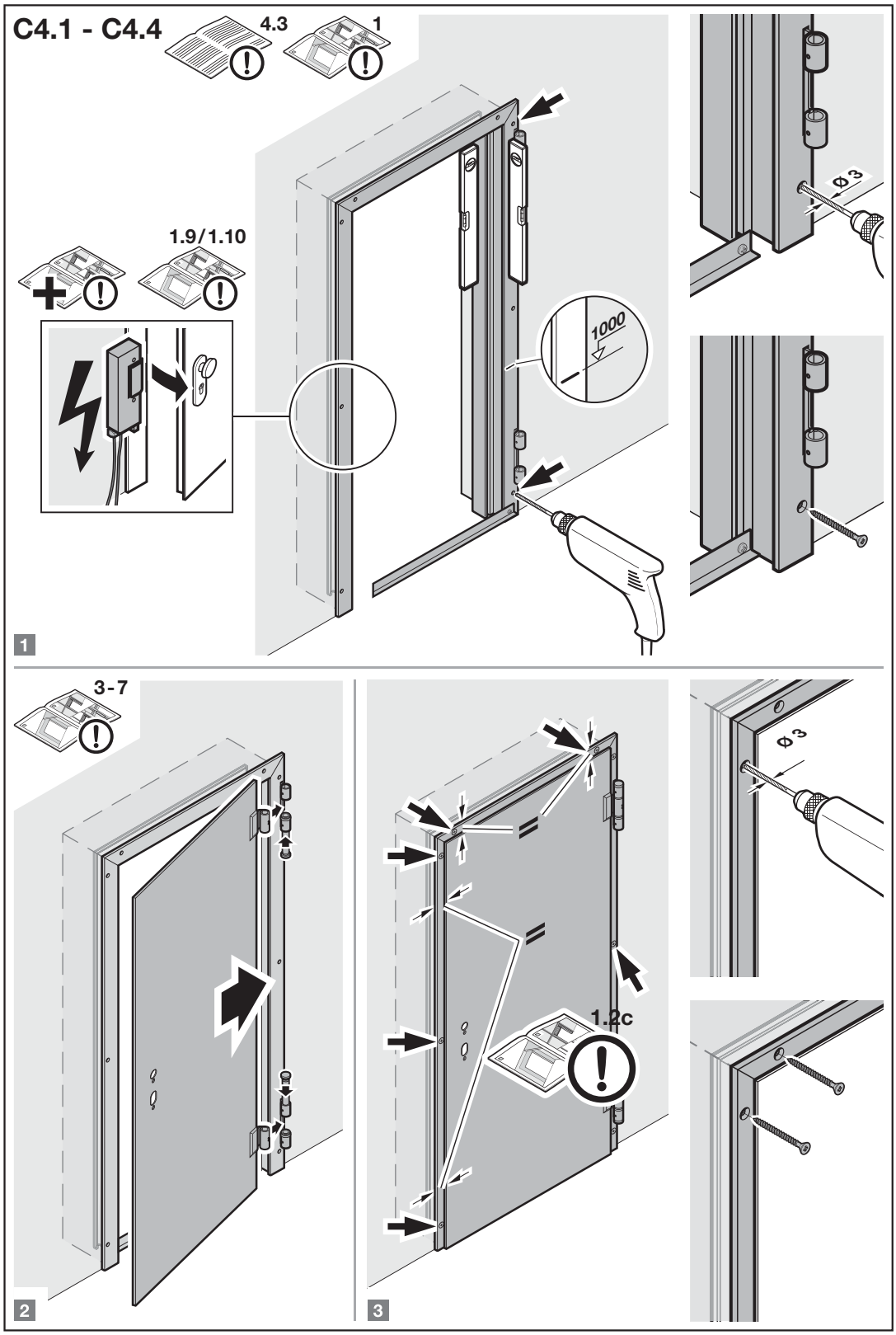
T90/EI$_2$90

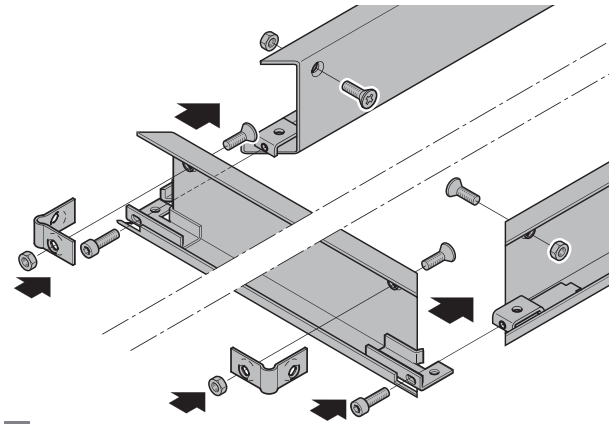


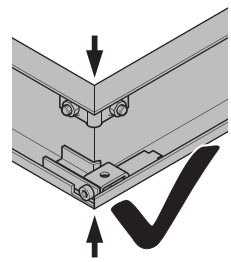


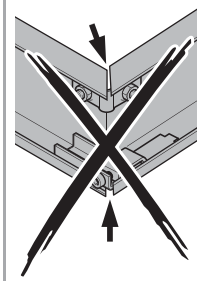
a DF-9,5-EN 520 / b DF-12,5-EN 520

→ C4.1 - C4.4 1 2 3 ...

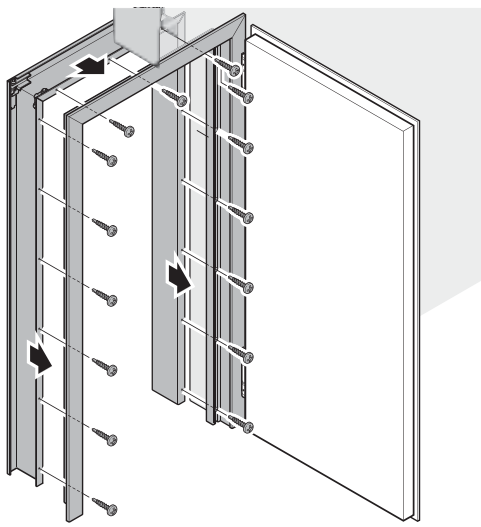

C4.1 - C4.4
4.3
1
1.9/1.10
1000
Ø3
1
3-7
2
1.2c
3
Ø3



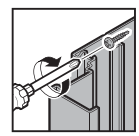




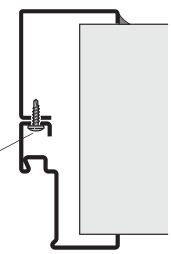
4

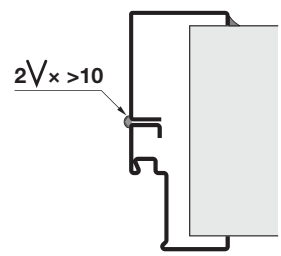


5a

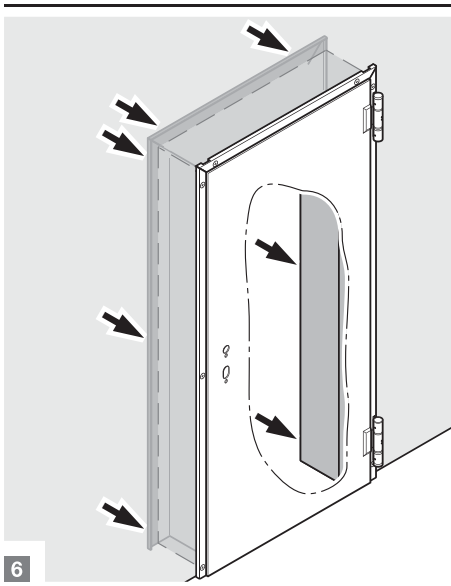


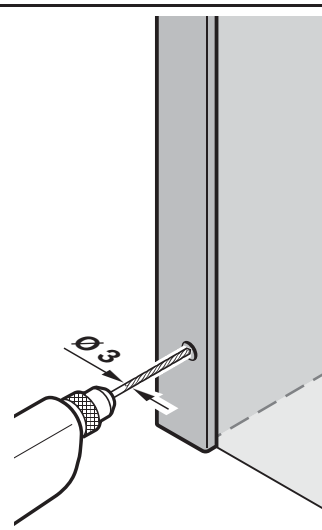
DIN 7504 ST 4,8 × 19-N-H
DIN 7981 4,8 × 16

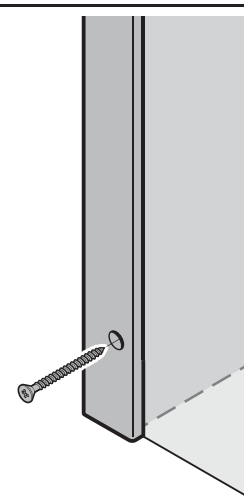




5b

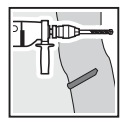


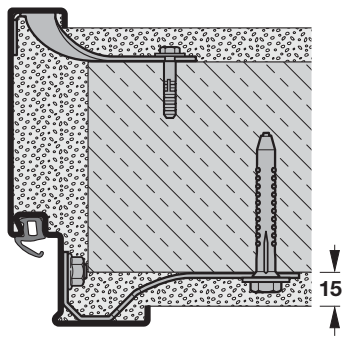


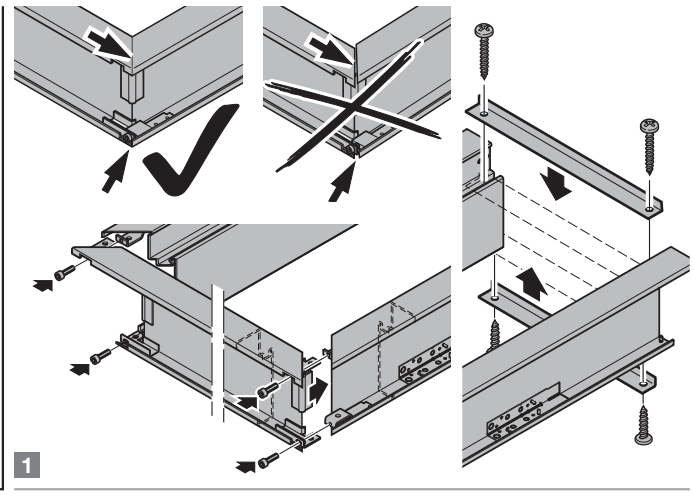


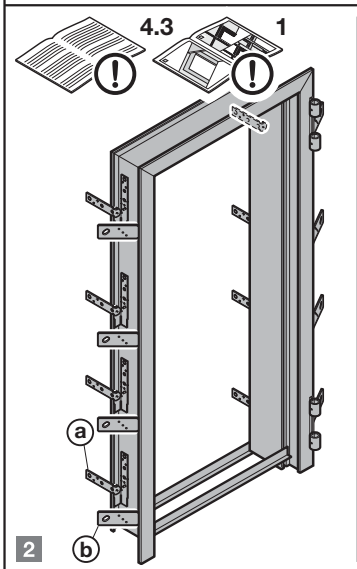
6

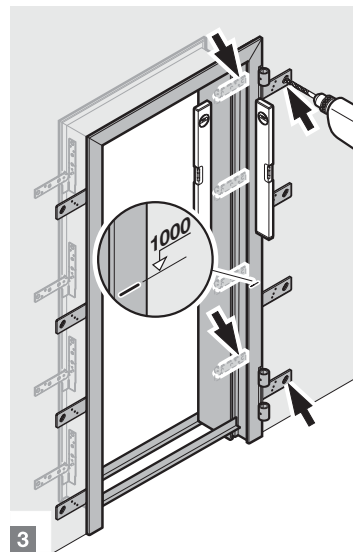
2D **Typ 1**
D1.1

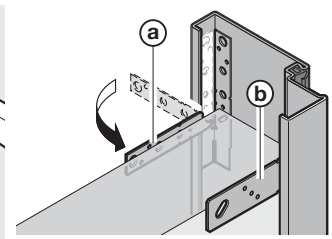


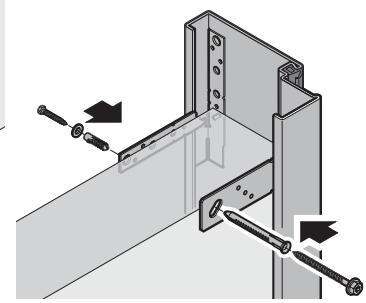


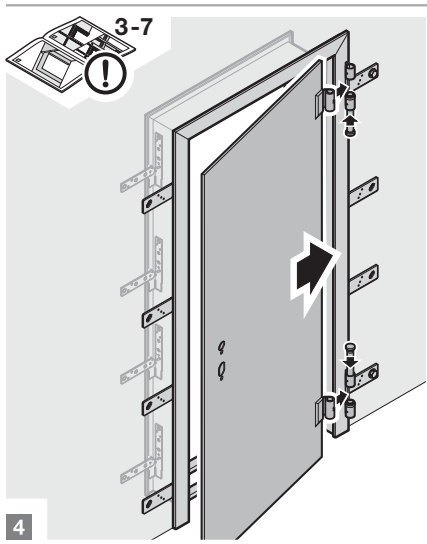


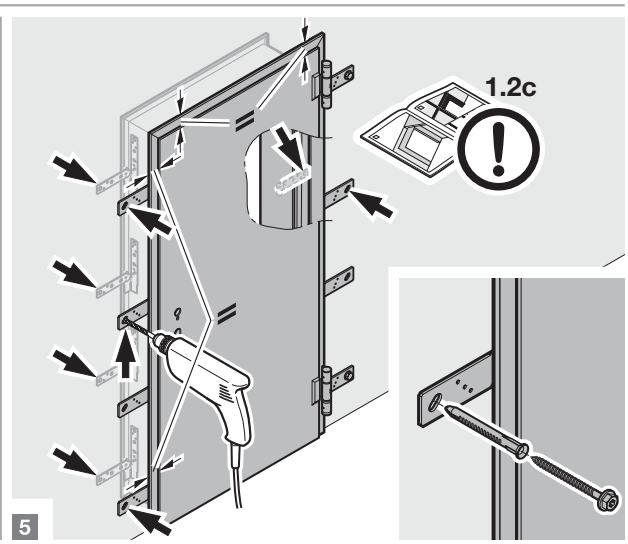




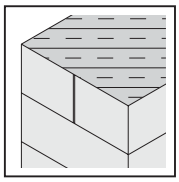


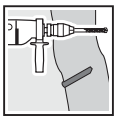




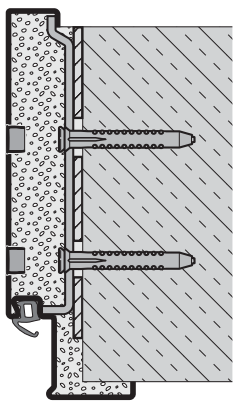


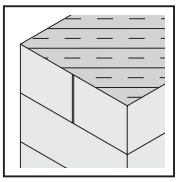
2D Typ 1

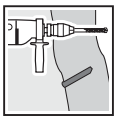




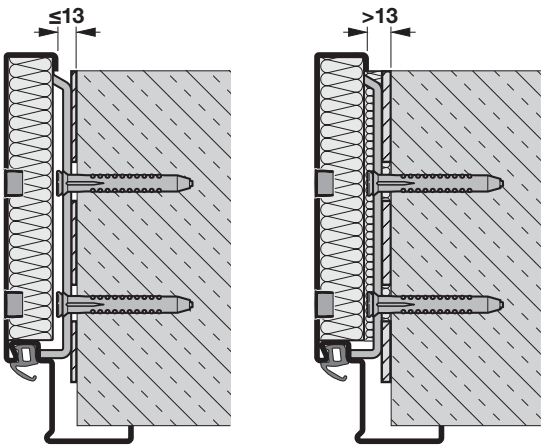
D1.2



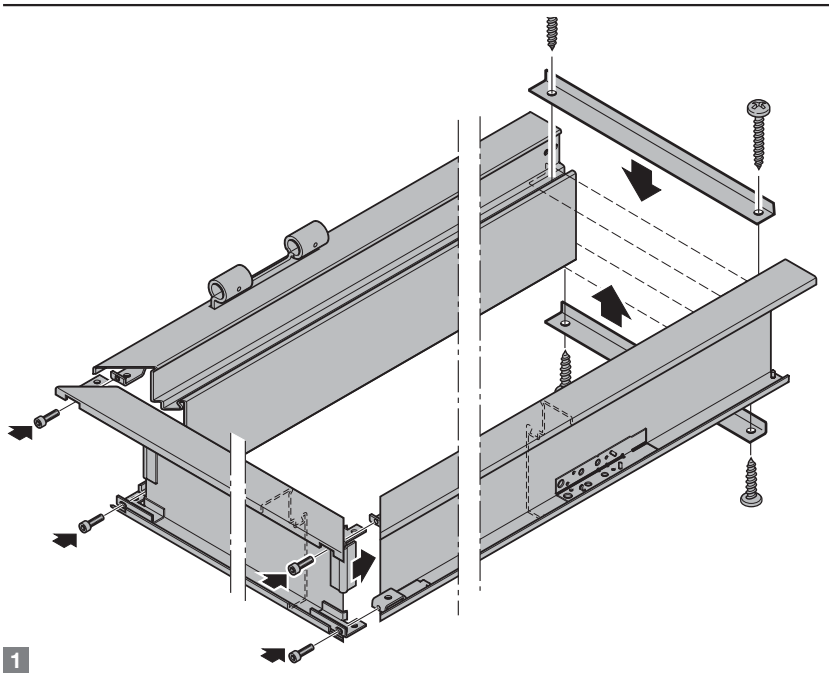


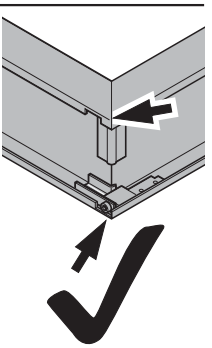


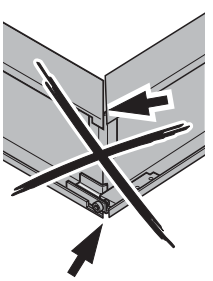
D1.3
max. T30 / $EI_2$30



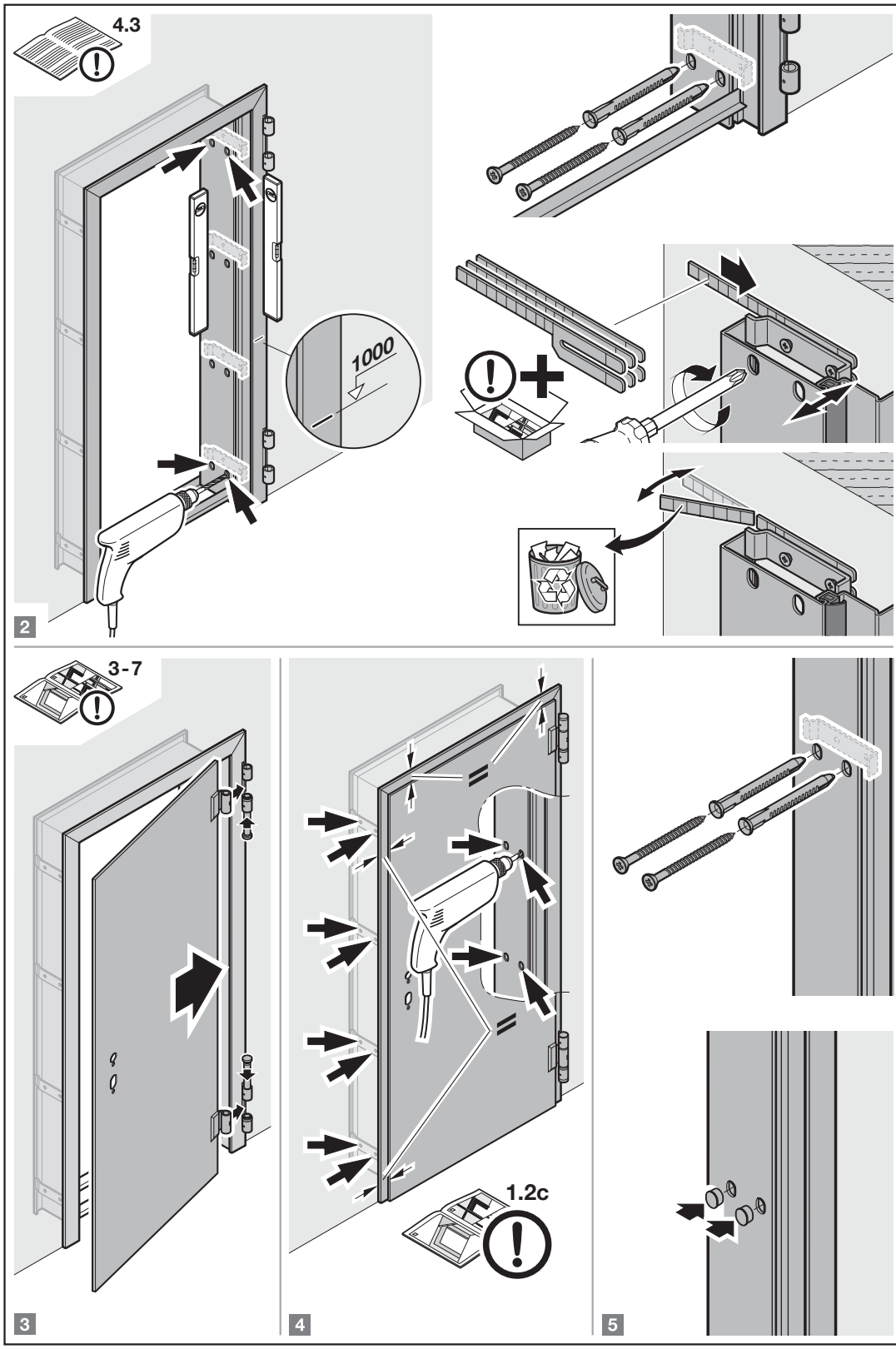
ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100



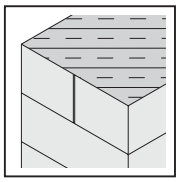
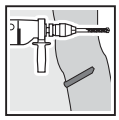




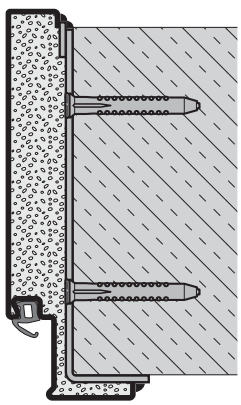
1

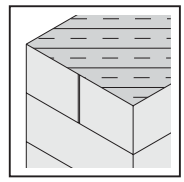
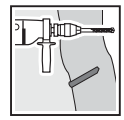

4.3
1000
2
3-7
3
1.2c
4
5

2D Typ 1

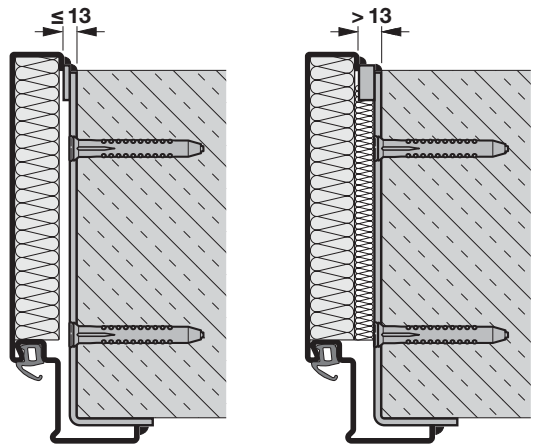



D1.4

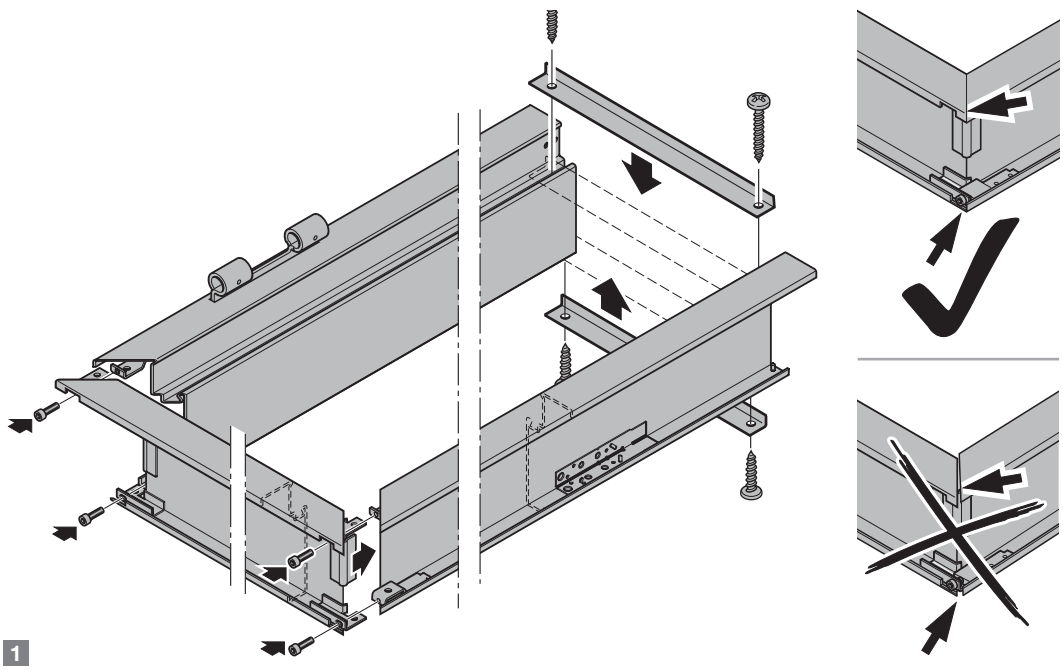


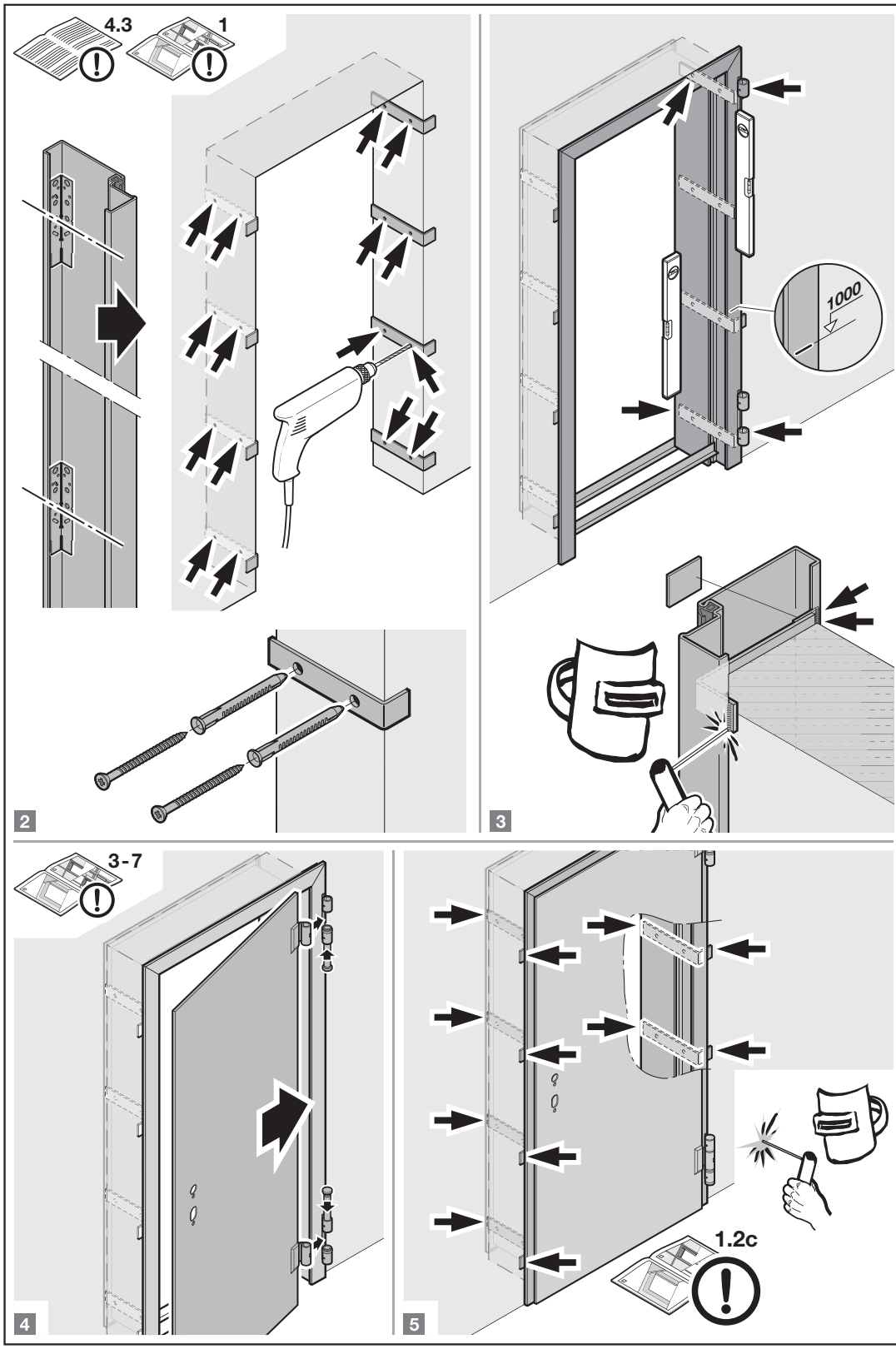
D1.5
max. T30 / $EI_2$30

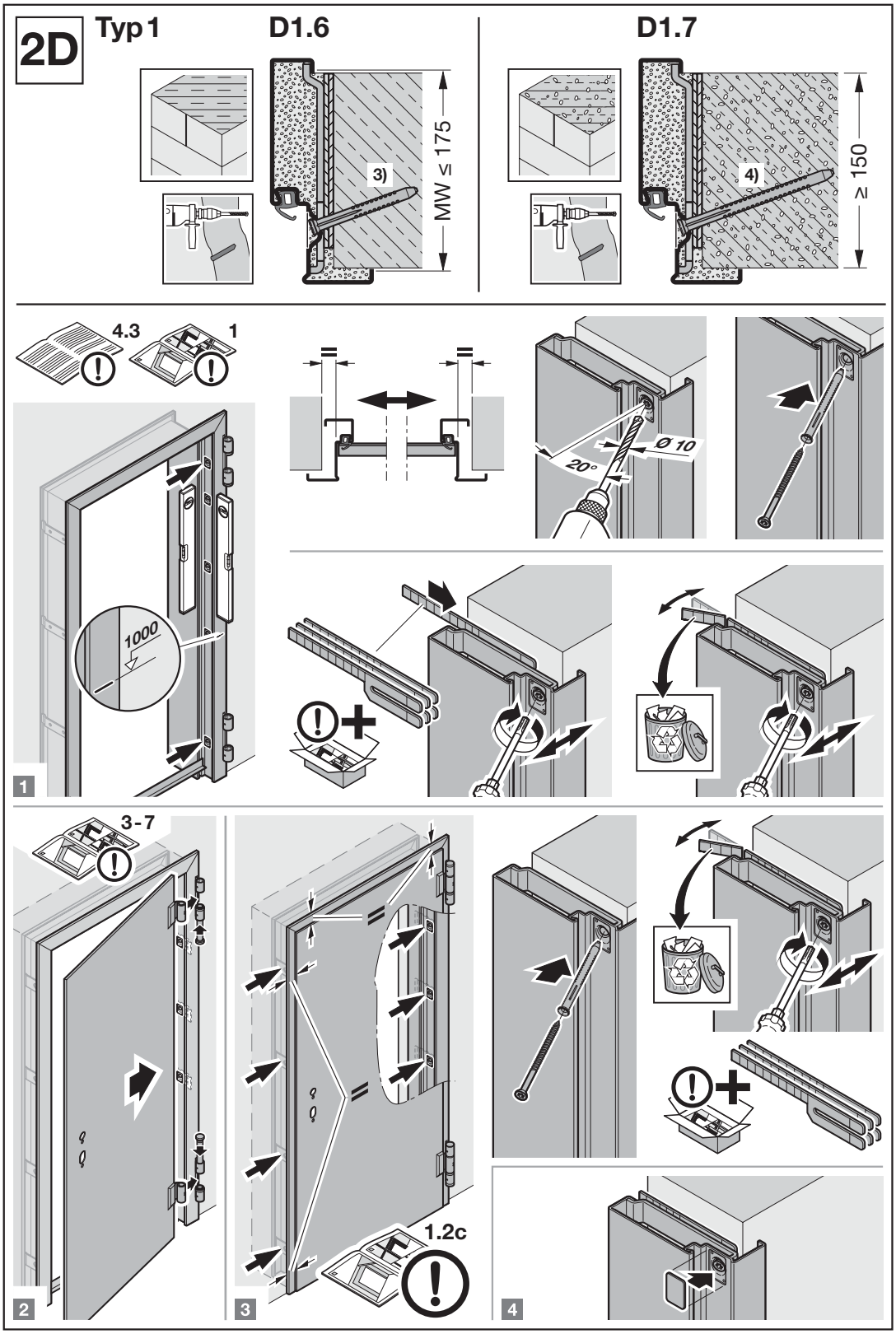


ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100

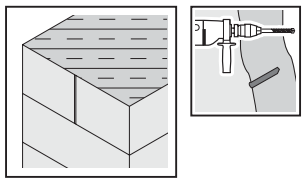


1

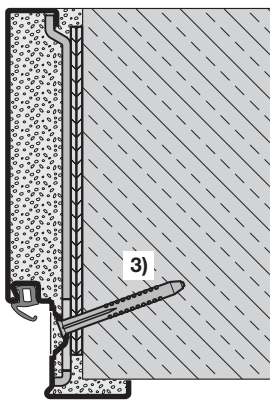

4.3
1
1000
2
3
3-7
1.2c
4
5

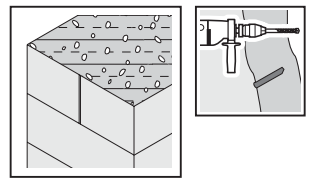

2D
Typ 1
D1.6
D1.7
3)
MW ≤ 175
4)
≥ 150
4.3
1
Ø 10
20°
1000
1
3-7
1.2c
2
3
4

2D Typ 1

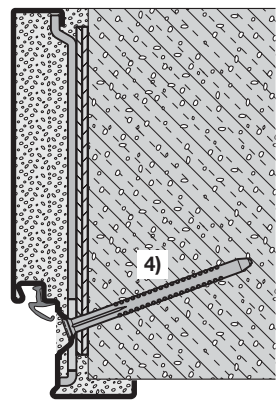


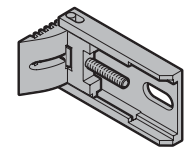
D1.8

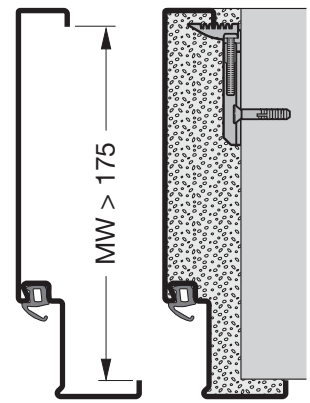


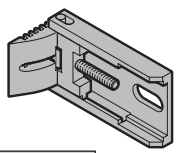


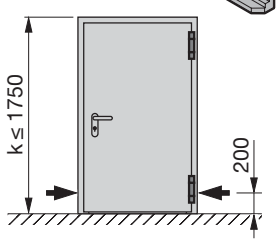
D1.9

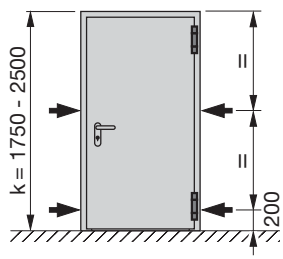


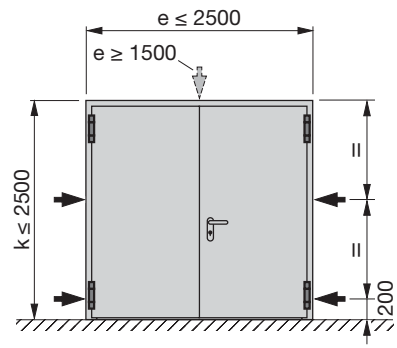


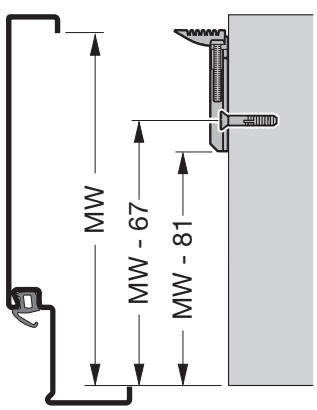


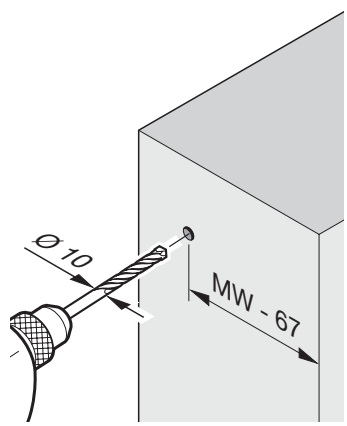


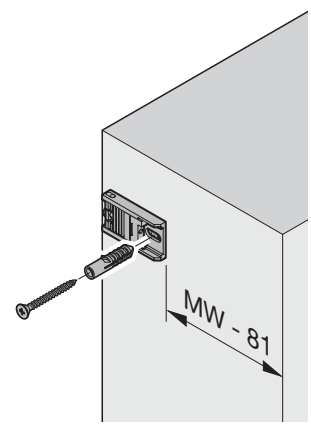




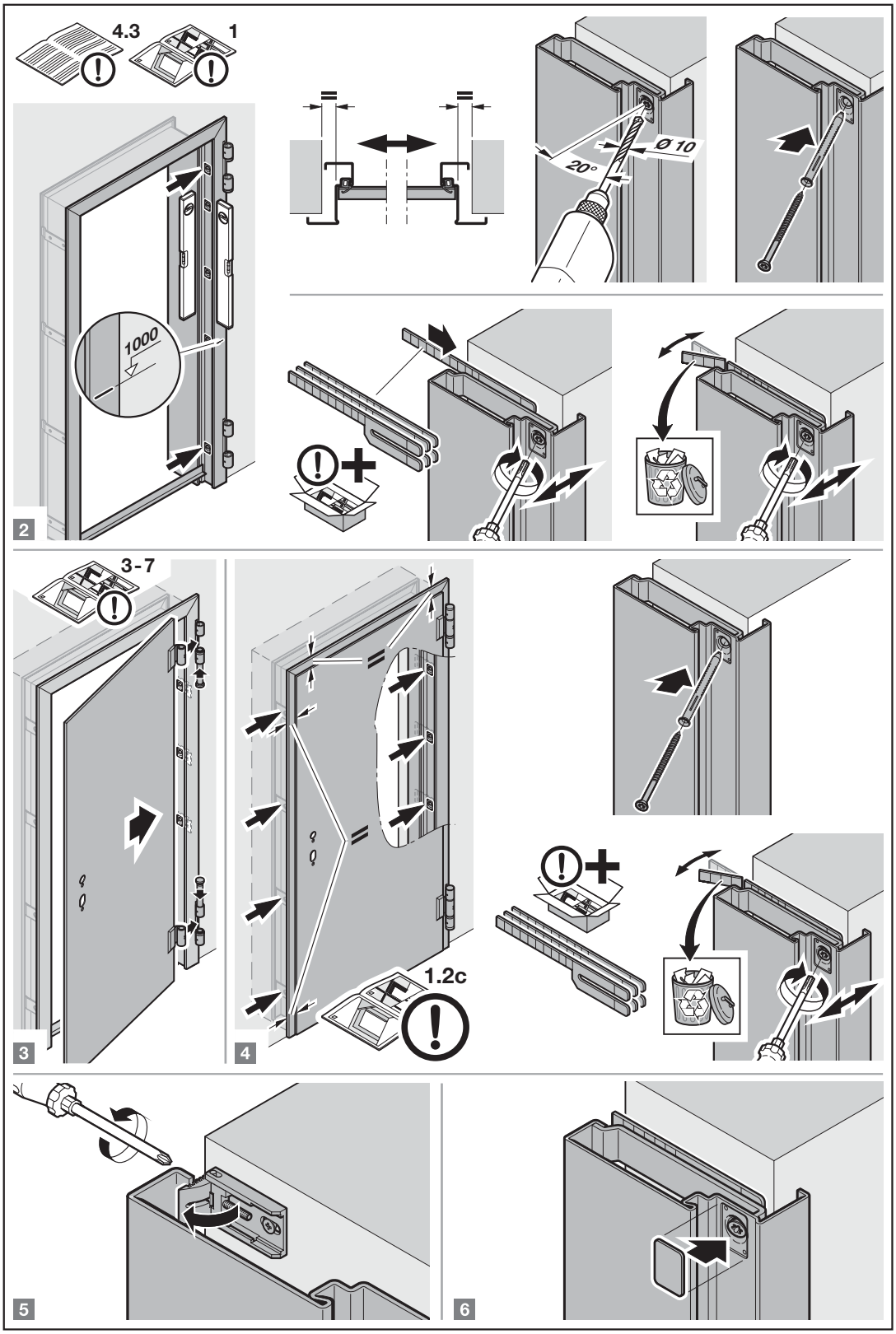




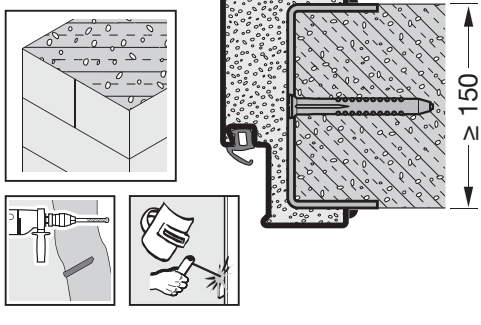


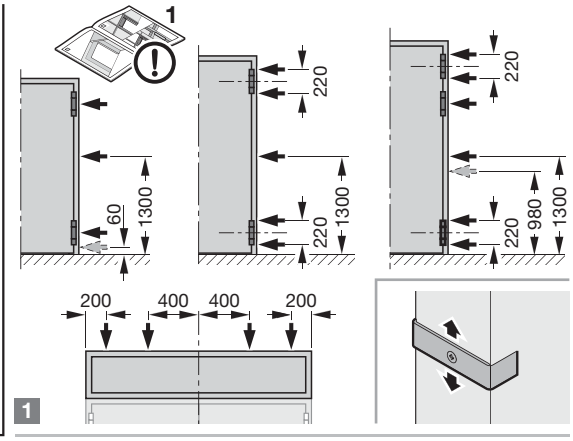


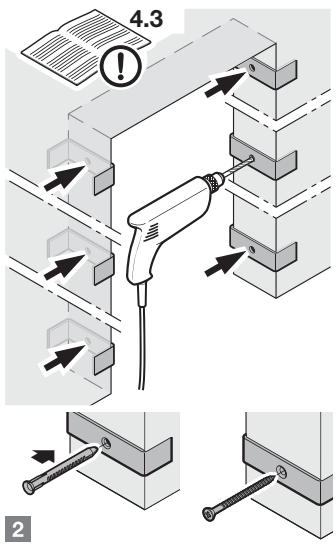
1

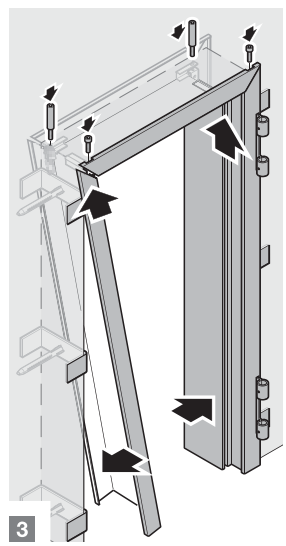

4.3
1
1000
Ø 10
20°
2
3-7
1.2c
3
4
5
6

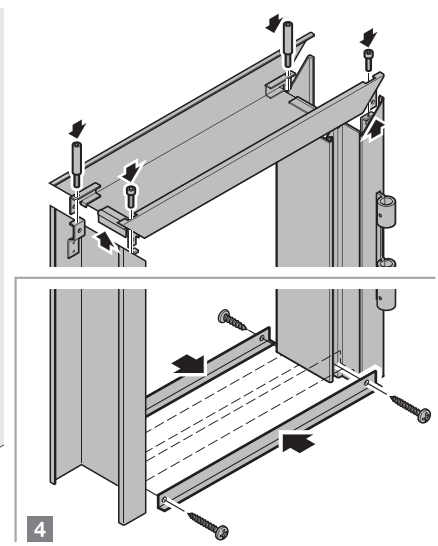
2D Typ 2 / D2.1

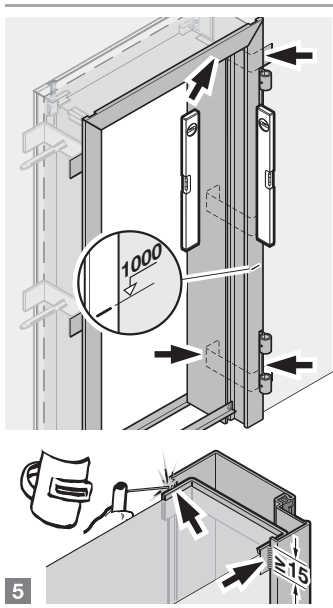

≥ 150

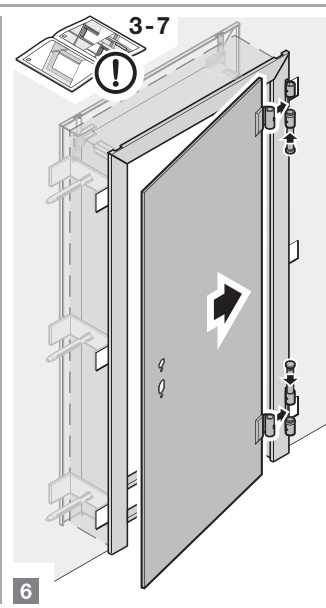

1
220
60
1300
220
1300
220
220
980
1300
200
400
400
200
1

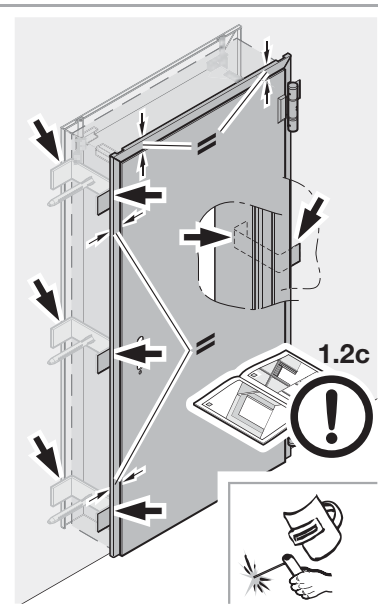

4.3
2


3

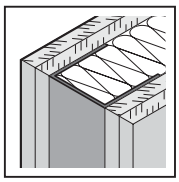

4


1000
≥ 15
5


3-7
6

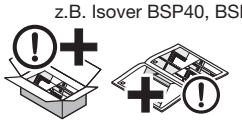

1.2c

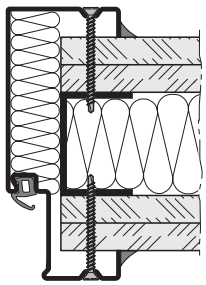
2D Typ 2

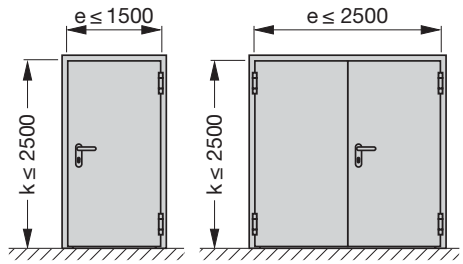


D2.2
max. T30/EI$_2$30

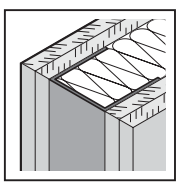
ρ ≥ 40 kg/m³
A (EN 13501-1)
z.B. Isover BSP40, BSP100

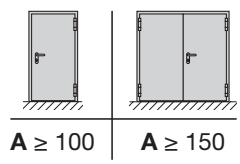




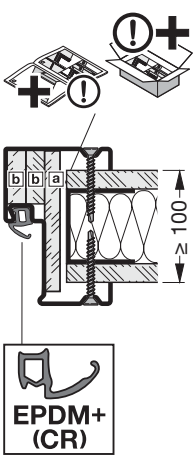


→ D2.2 - D2.5 1 2 3…

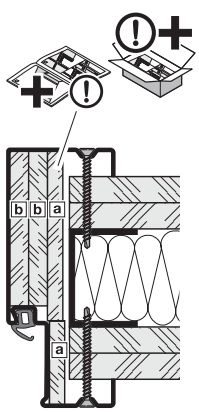




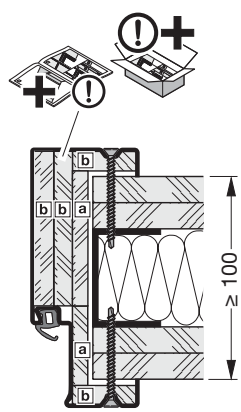
D2.3
T30/EI$_2$30



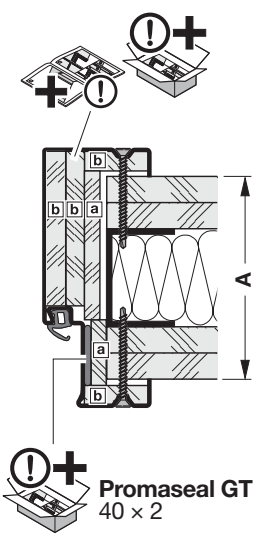
D2.4
T30/EI$_2$30



D2.5
T60/EI$_2$60

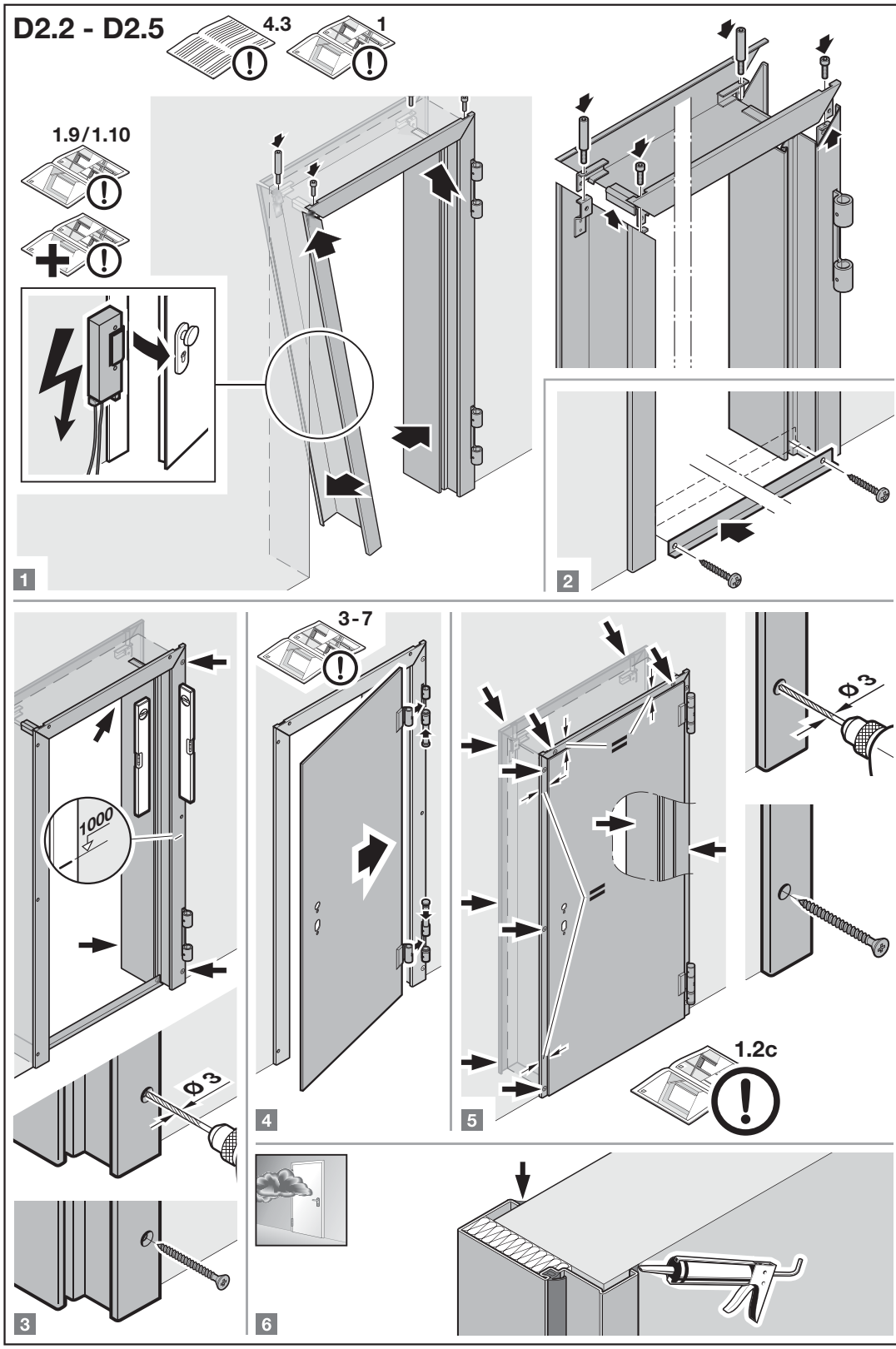


T90/EI$_2$90

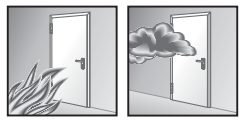


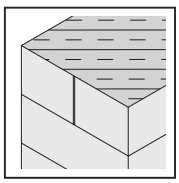
a DF-9,5-EN 520 / b DF-12,5-EN 520

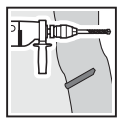
→ D2.2 - D2.5 1 2 3…

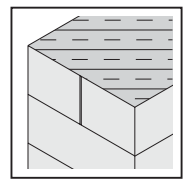

D2.2 - D2.5
4.3
1
1.9/1.10
1
2
1000
3-7
4
5
Ø3
1.2c
3
6

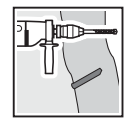
2D Typ 3



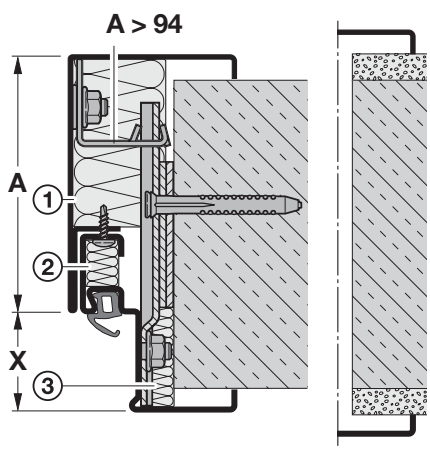




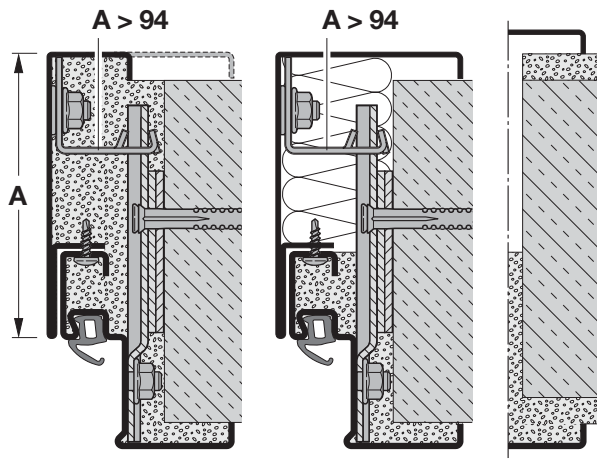


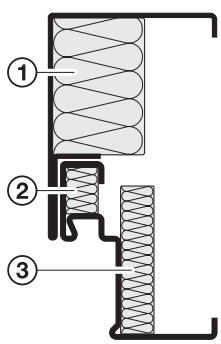


D3.1
max. T30/EI$_2$30



D3.2
max. T90/ EI$_2$90



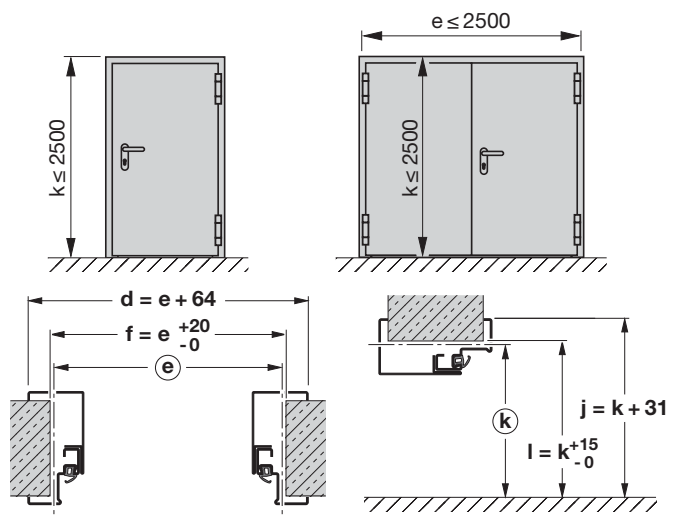


ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100

① = 40 × (**A** - 42)

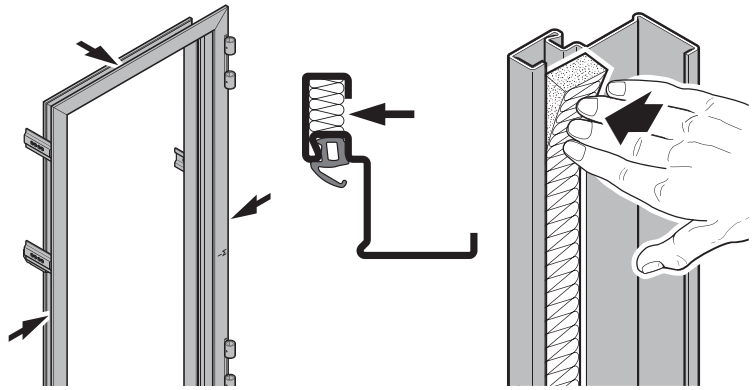
② = 15 × 22,5

③ = 15 × (**X** + 24)



→ D3.1 / D3.2 1 2 3 …

D3.1 / D3.2



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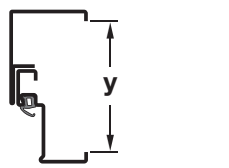

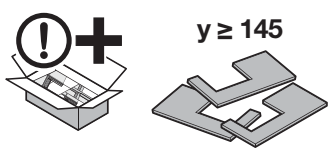

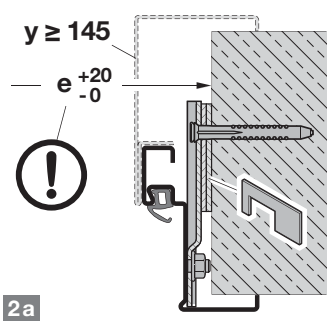

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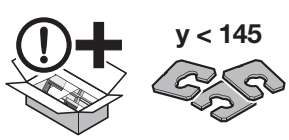

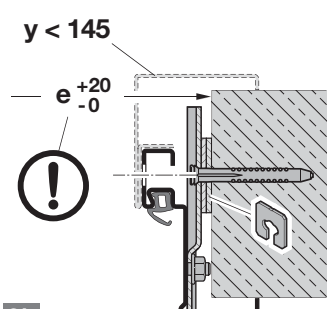

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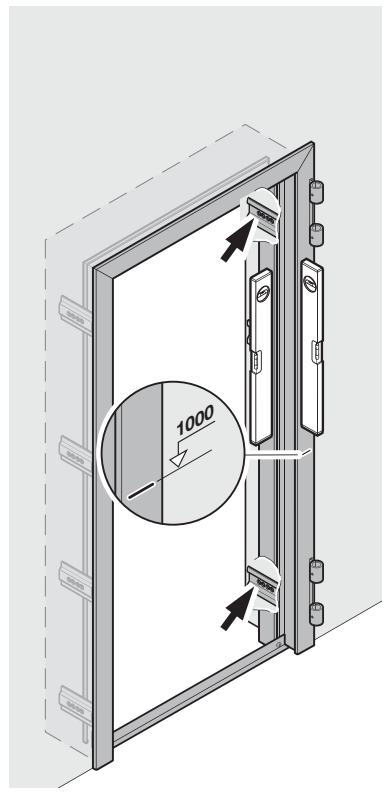
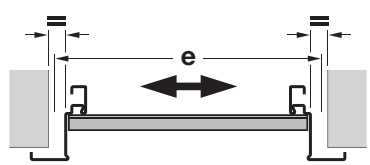
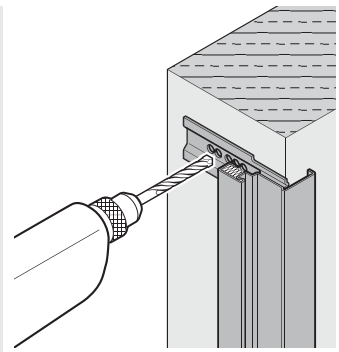
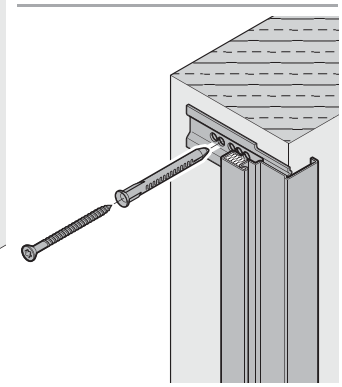
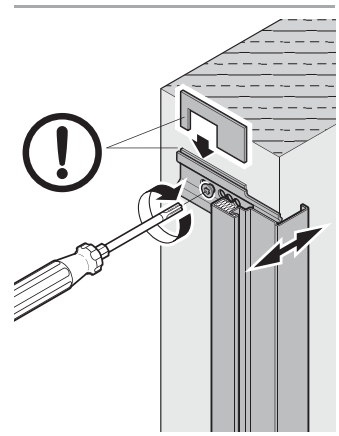
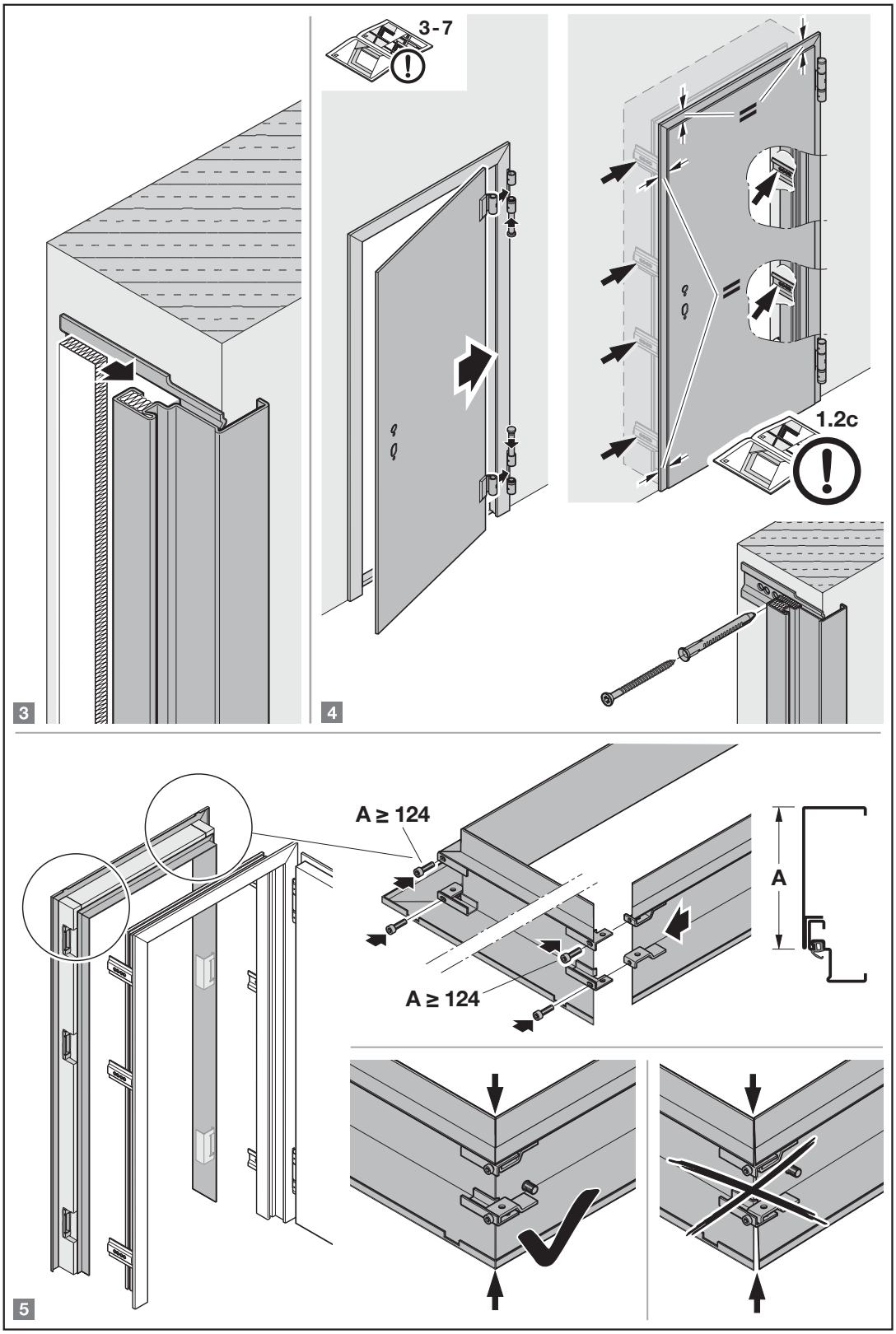


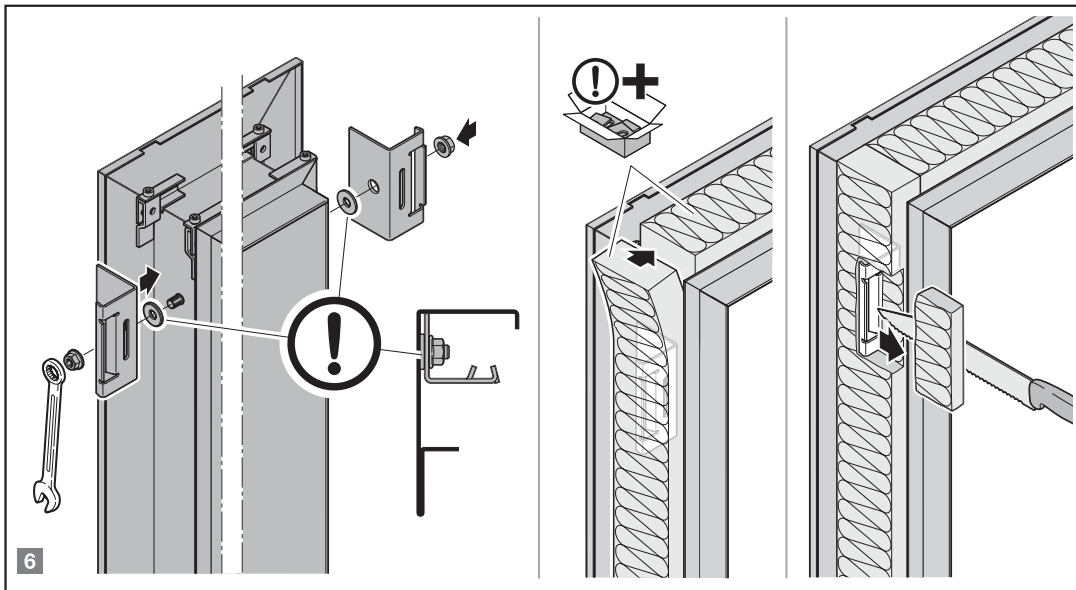









3-7
1.2c
A ≥ 124
A ≥ 124
A
3
4
5



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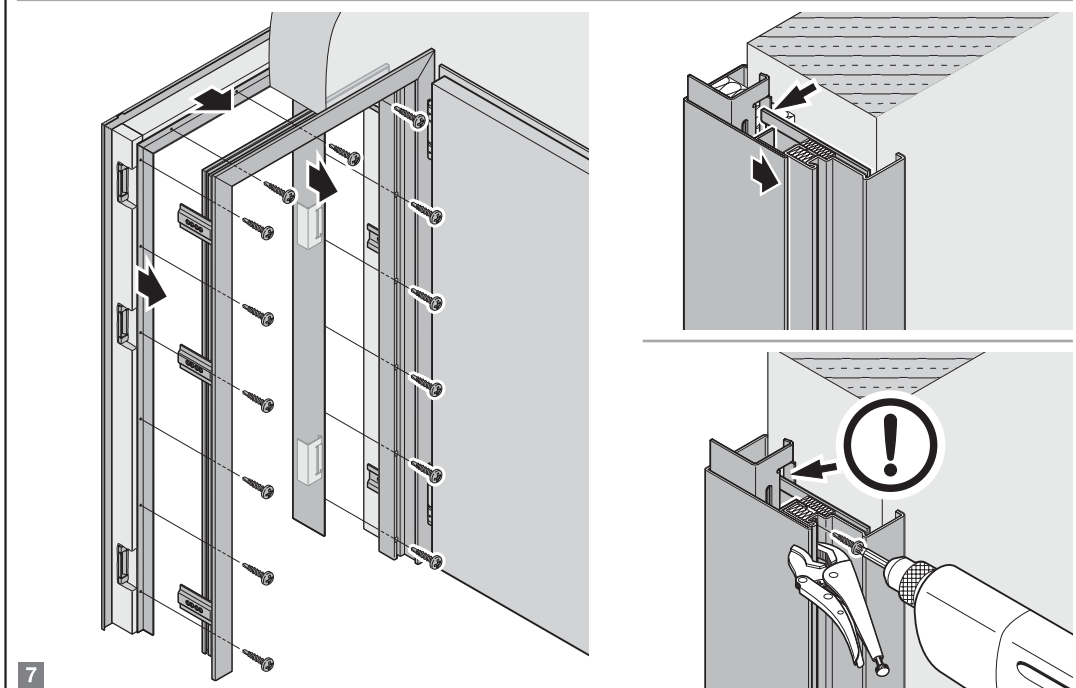

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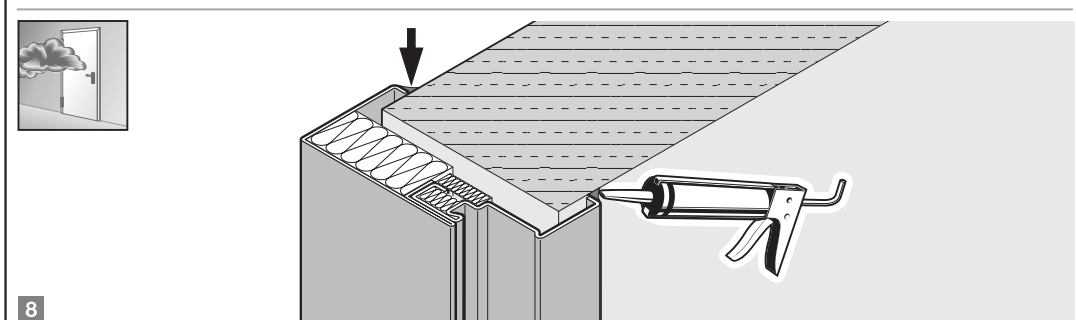
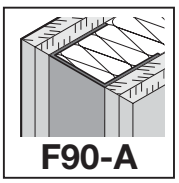


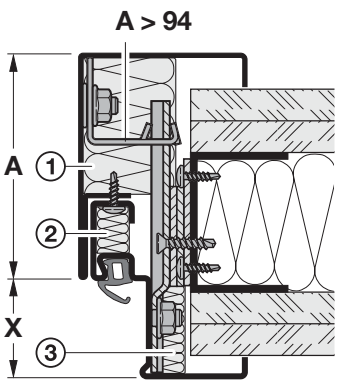
8

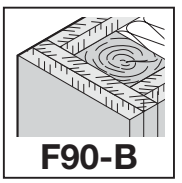
2D Typ 3
max. T30/EI$_2$30



D3.3
F90-A

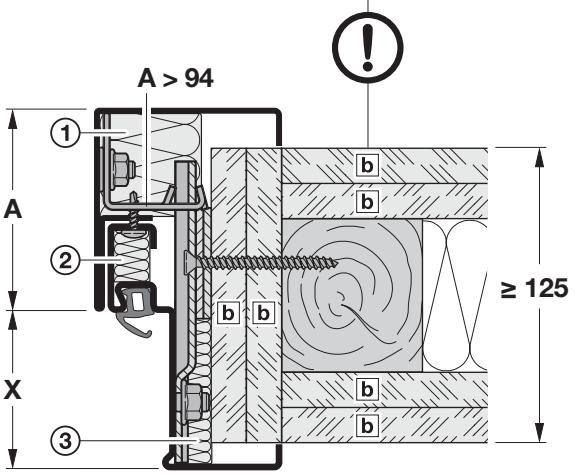
F90-A DIN 4102-4 Tab. 10.2



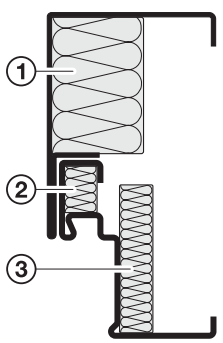


D3.4
F90-B

F90-B DIN 4102-4 Tab. 10.3

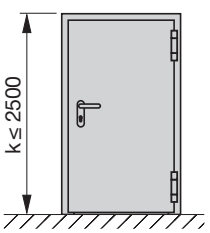


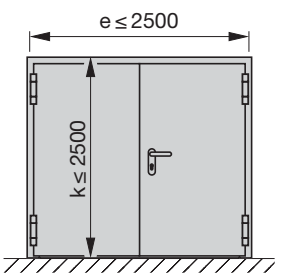
b DF-12,5-EN 520

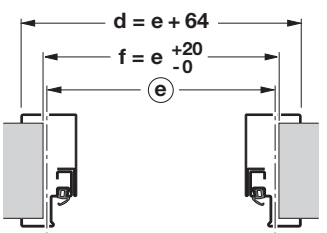


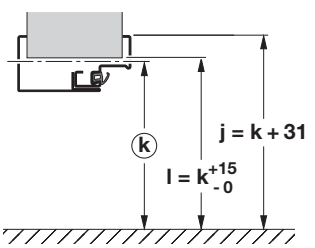
ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100

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



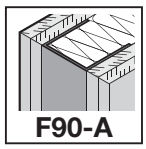


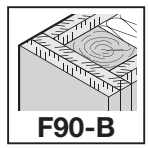


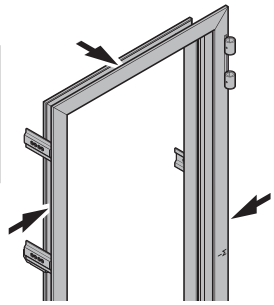


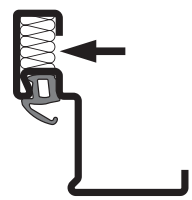
→ D3.3 / D3.4 1 2 3 …

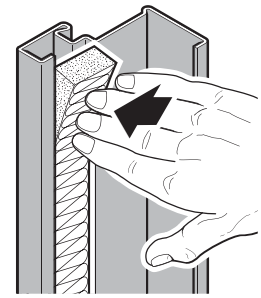
D3.3 / D3.4



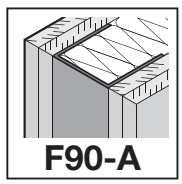


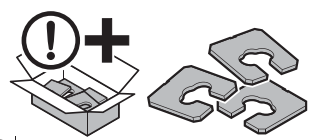


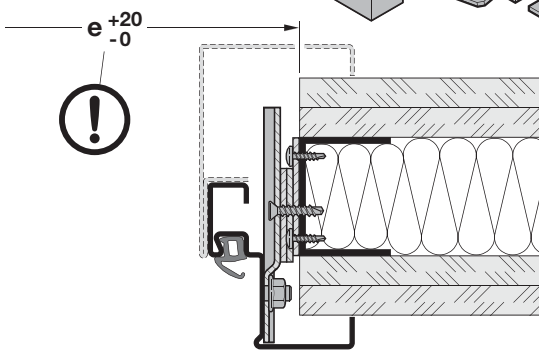


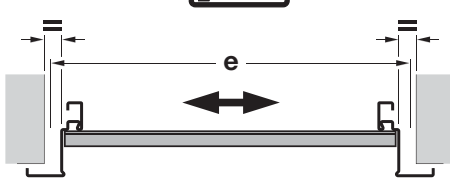


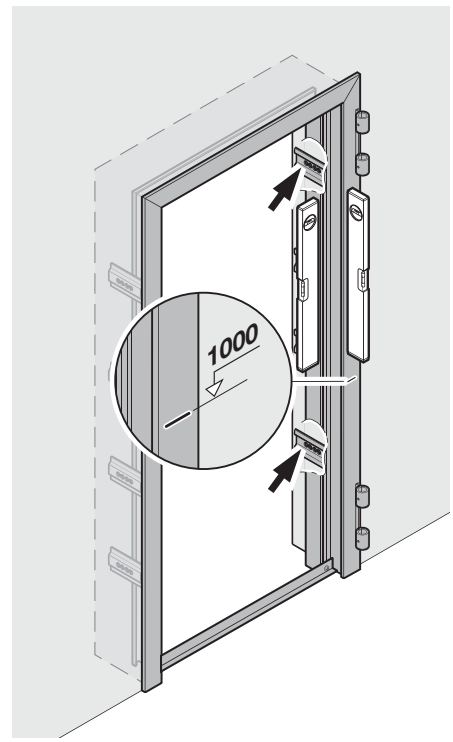
D3.3

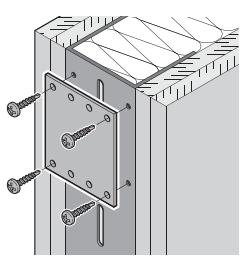


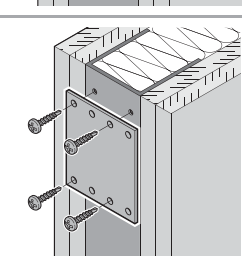


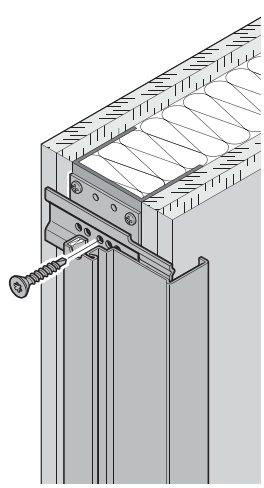


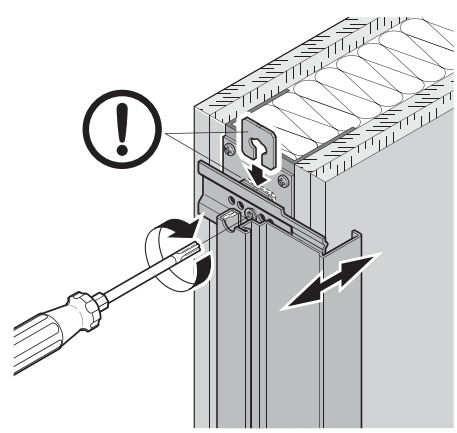






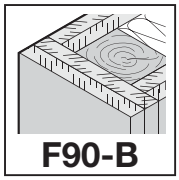




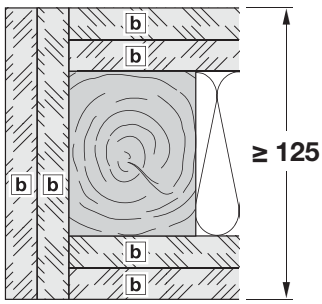


→ D3.3 / D3.4 2 3 …

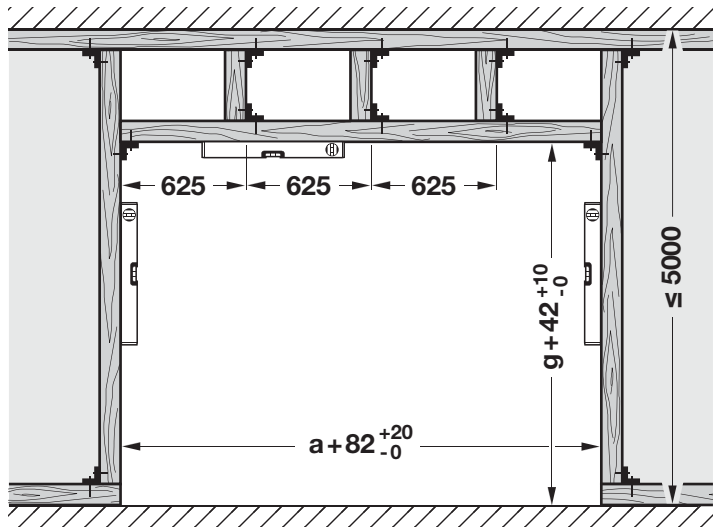
D3.4

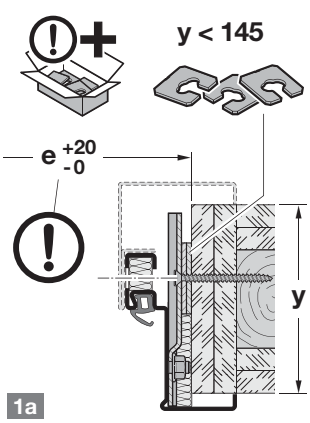


F90-B



b DF-12,5-EN 520





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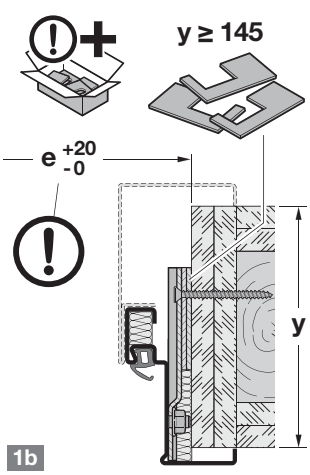

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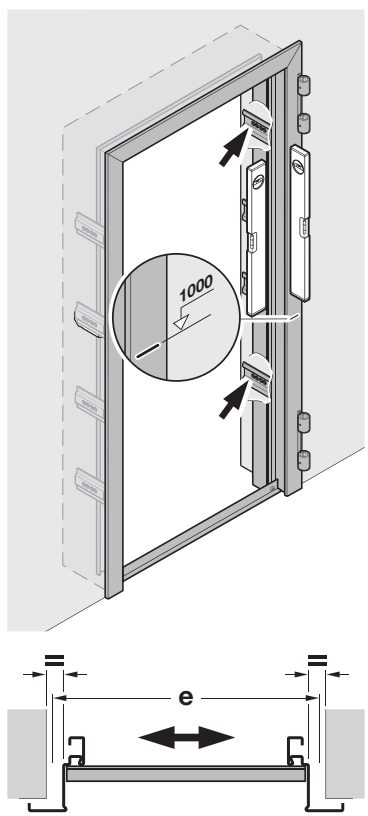
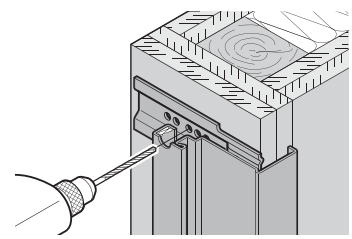
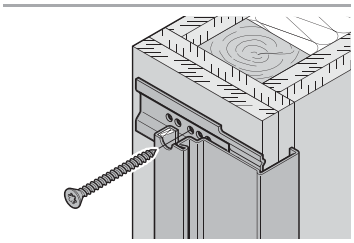
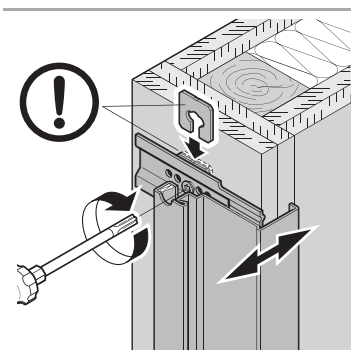


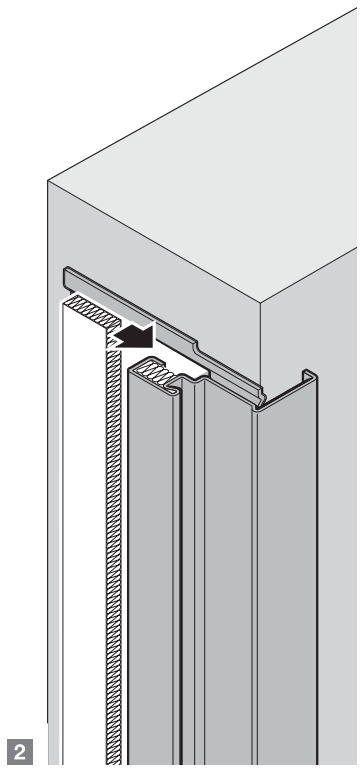


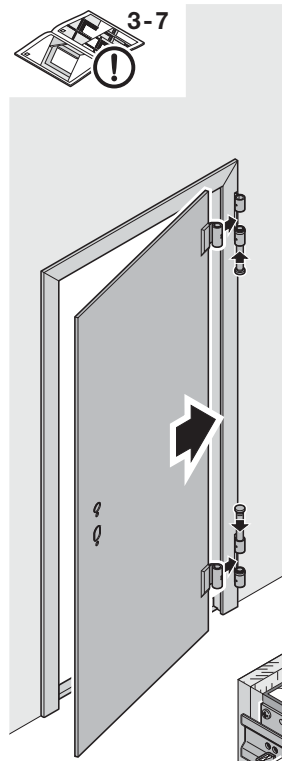


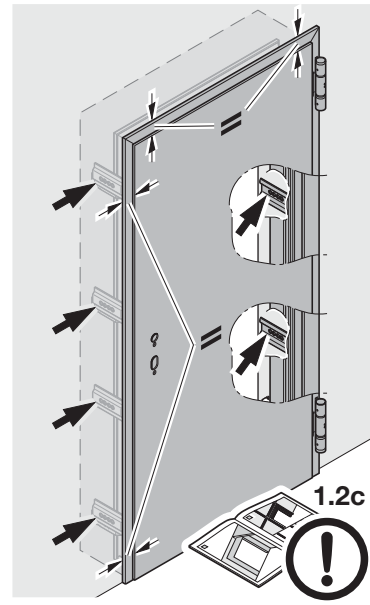


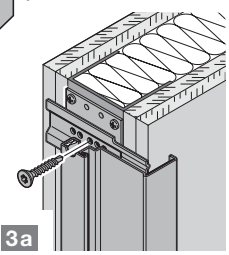
→ D3.3 / D3.4 2 3 …

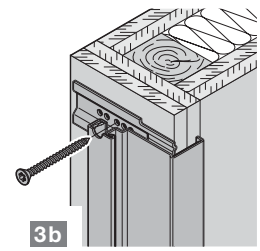
D3.3 / D3.4

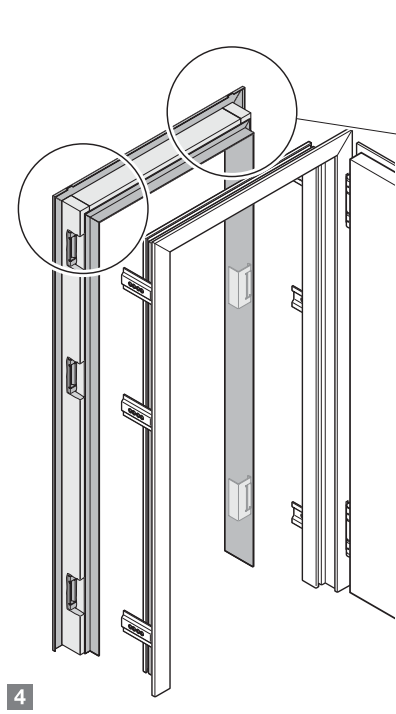


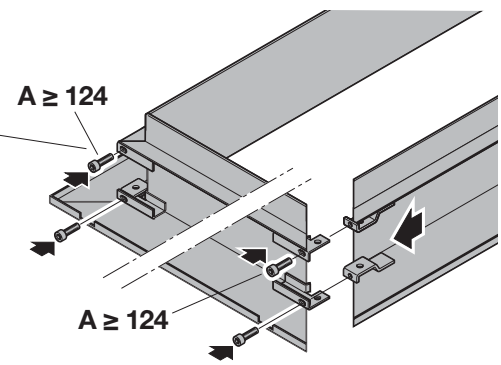


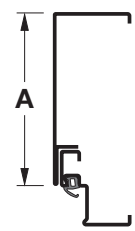


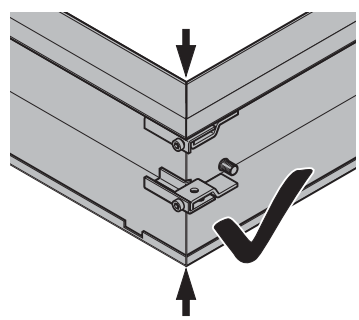


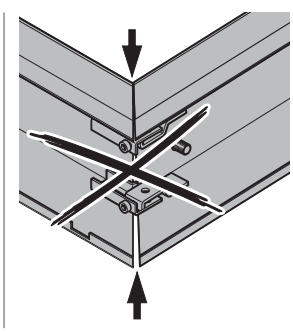


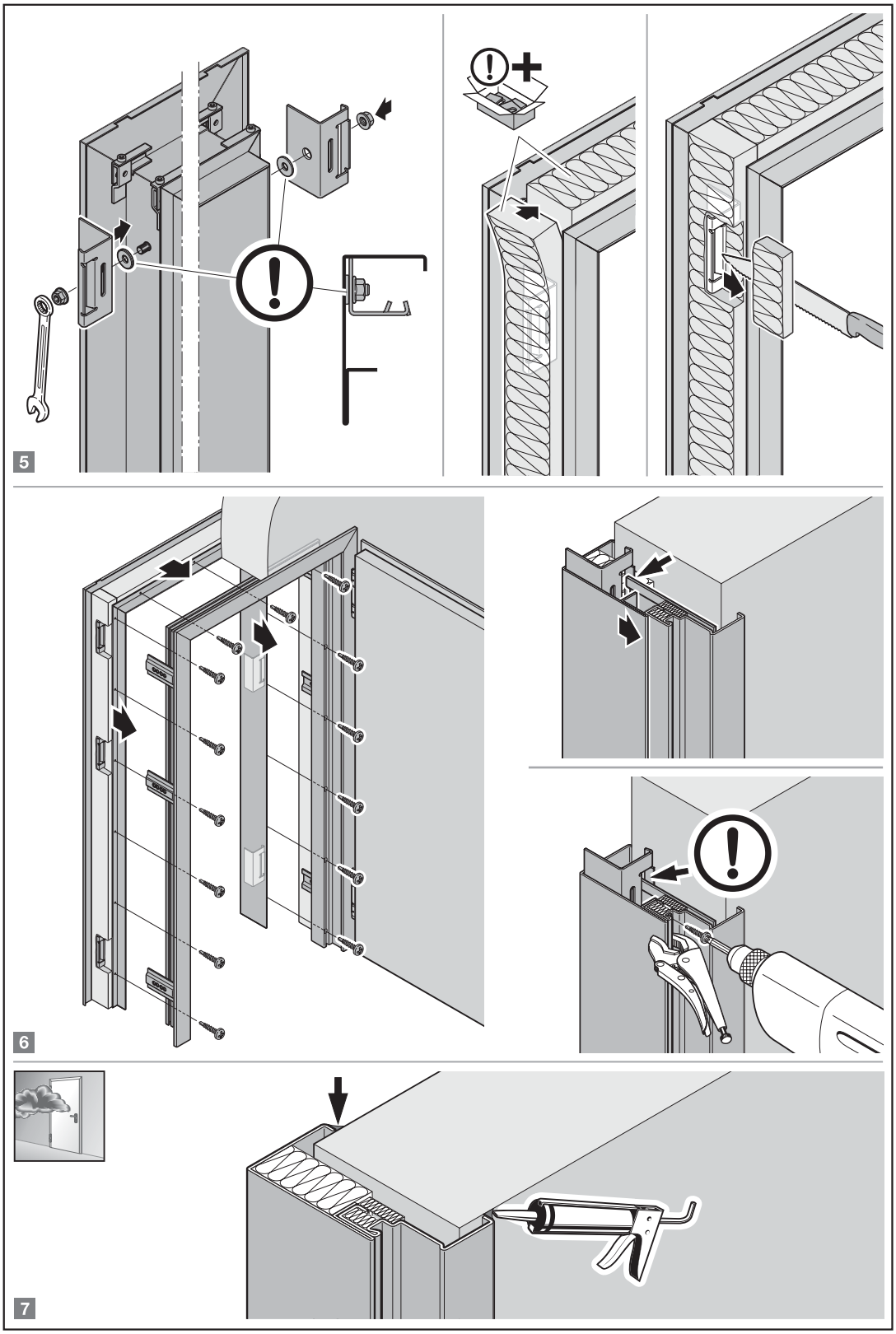




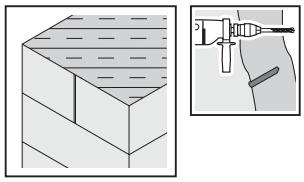


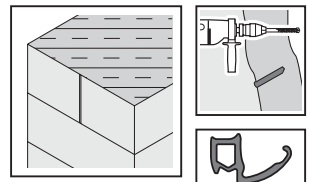





5
6
7

2E Typ 1

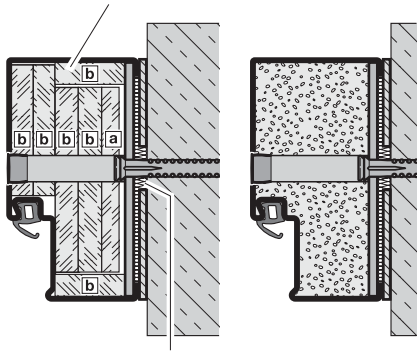




e ≤ 1500
max. T30/EI$_2$30

e ≤ 1320
max. T60/EI$_2$60
max. T90/EI$_2$90

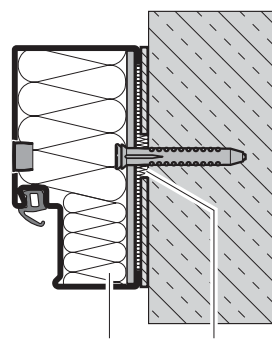
E1.1



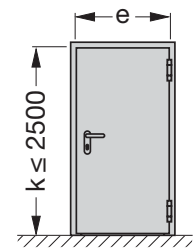
ρ ~ 100 kg/m^3
A (EN 13501-1)
z.B. Isover BSP100

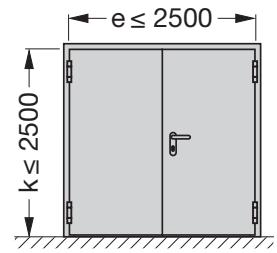
a DF-9,5-EN 520 b DF-12,5-EN 520

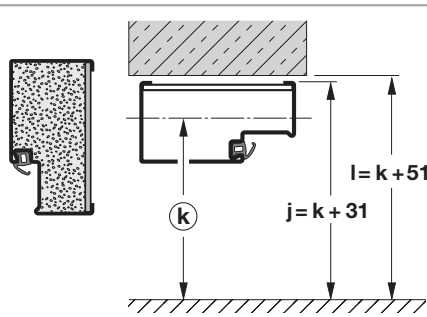
E1.2
max. T30/EI$_2$30

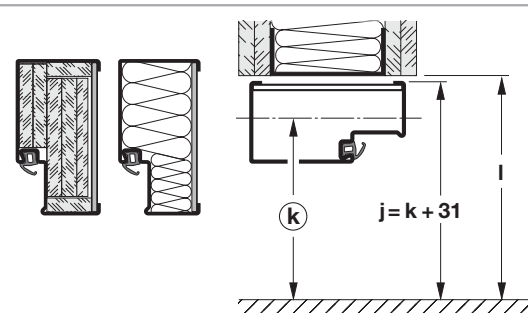


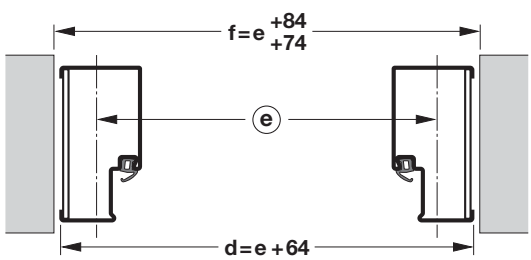
ρ ~ 100 kg/m^3
A (EN 13501-1)
z.B. Isover BSP100

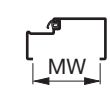








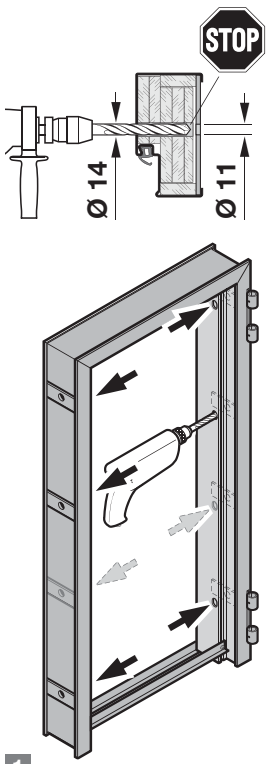




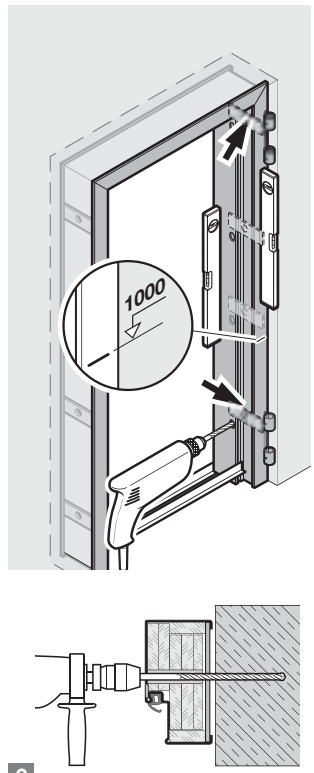
	l
≤ 125	k + 41
> 125	k + 51

➔ E1.1 / E1.2 1 2 3 ...

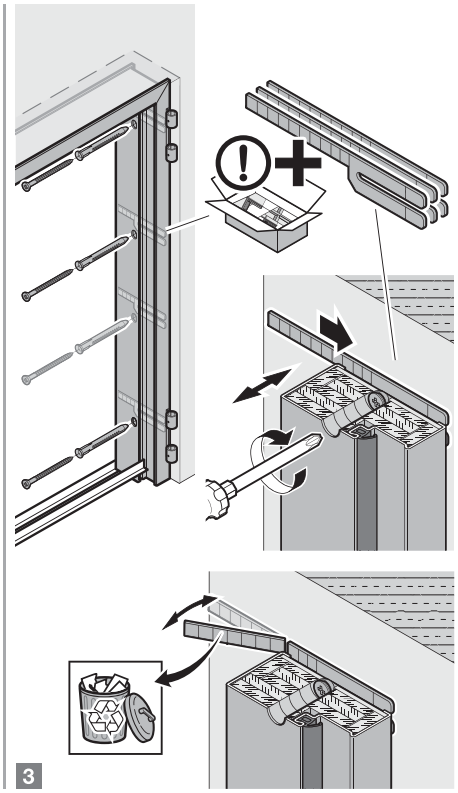
E1.1 / E1.2



1



2



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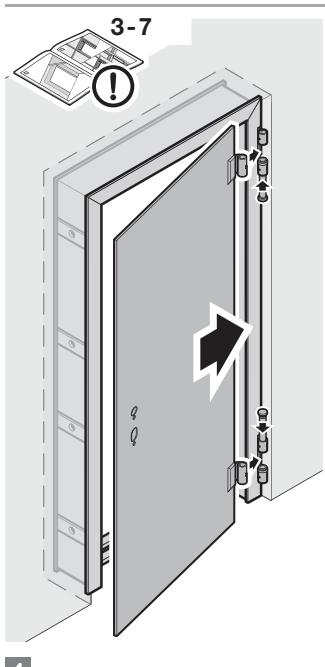

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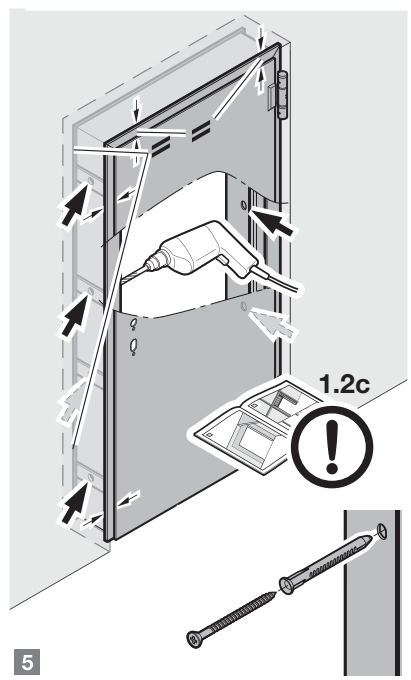

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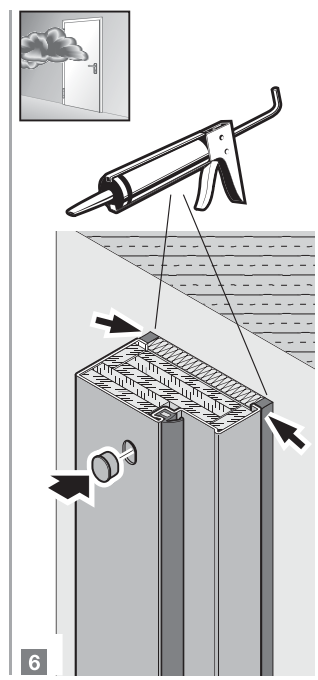
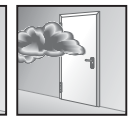
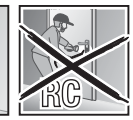
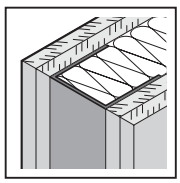


6

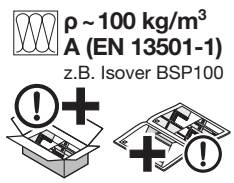
2E Typ 1

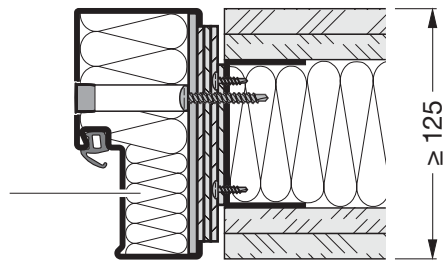
max. T30 / $EI_2$30

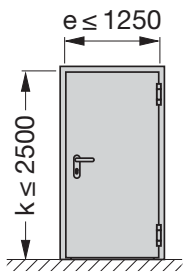



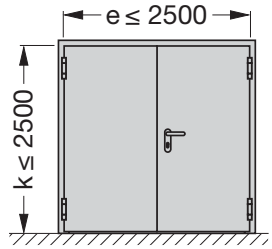


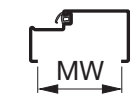
E1.3



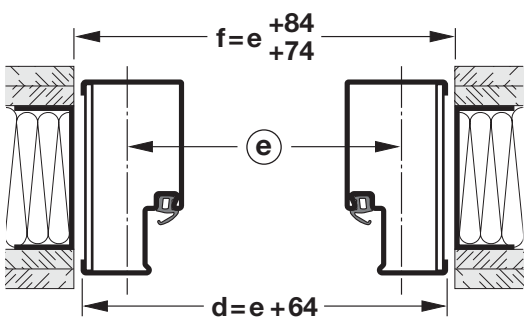


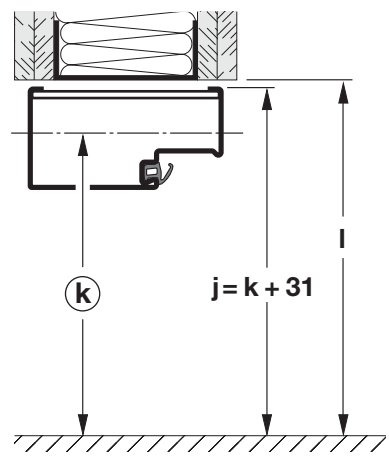




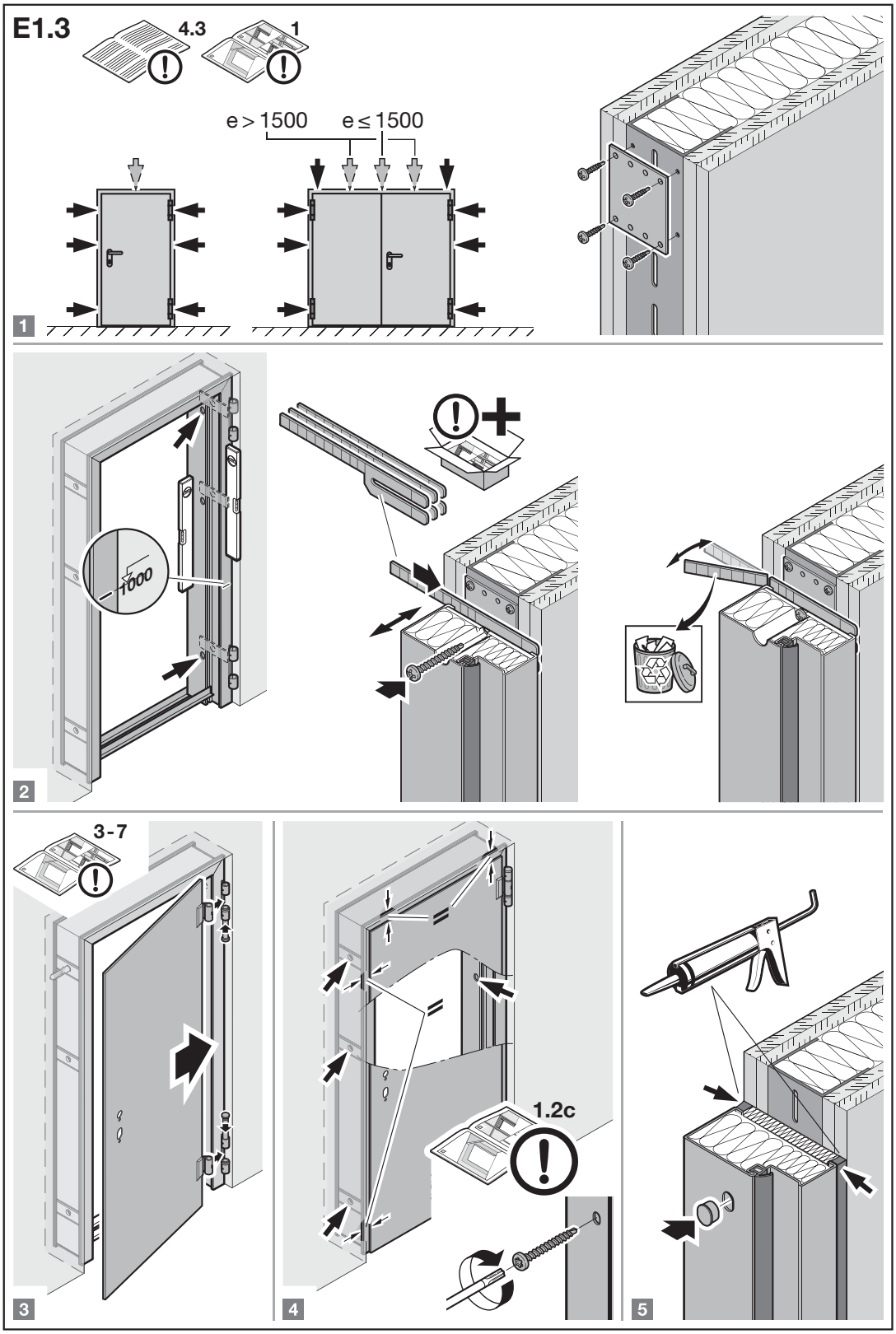


	l
≤ 125	**k + 41**
> 125	**k + 51**

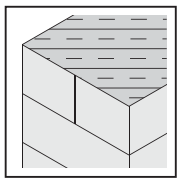


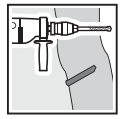


→ E1.3 1 2 3 …

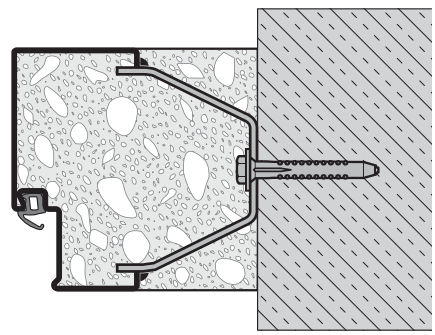

E1.3
4.3
1
e > 1500
e ≤ 1500
1
1000
2
3-7
3
1.2c
4
5

2E Typ 1

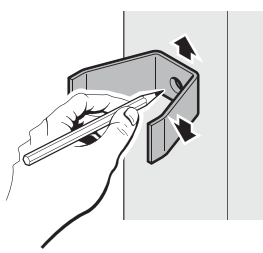


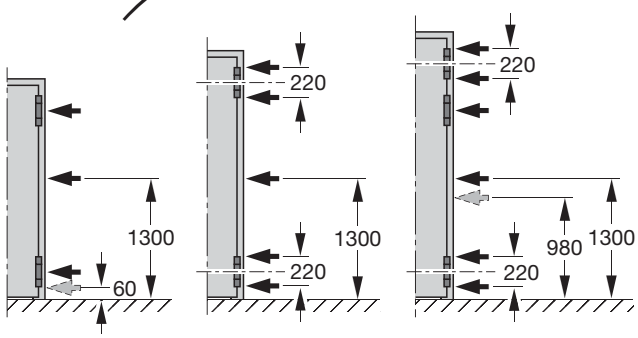


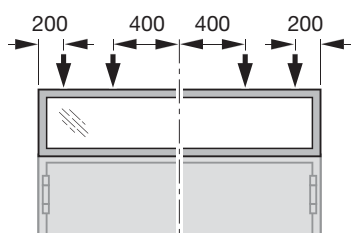
E1.4



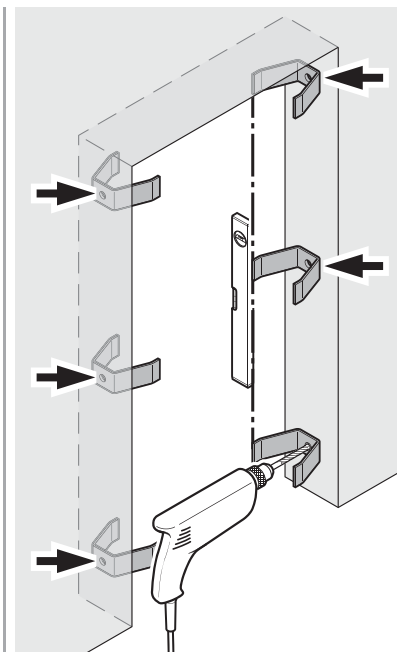
4.3 1.2a/1.2b

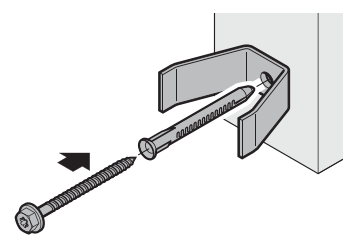




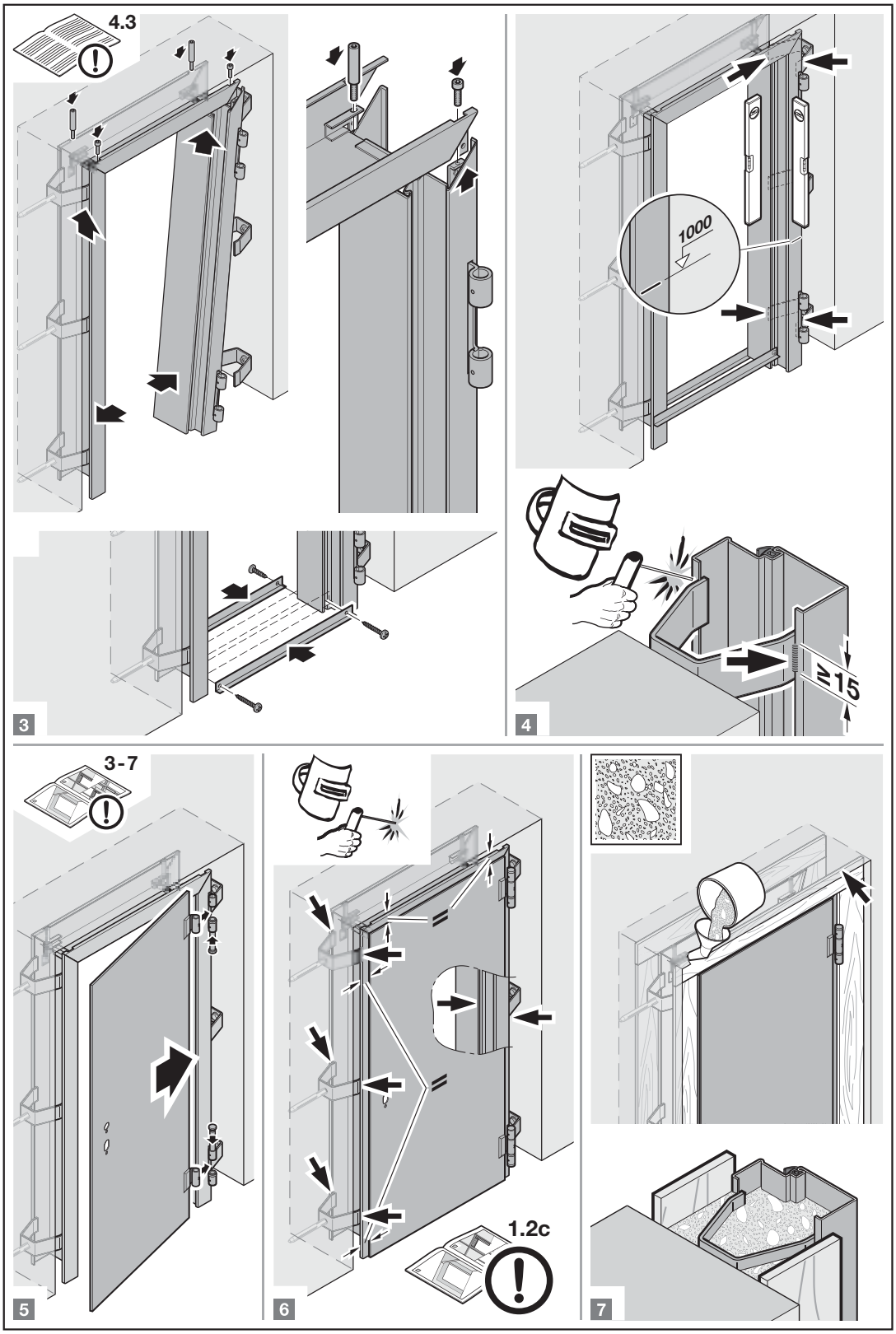


1

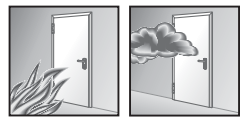


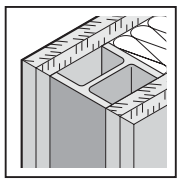


2

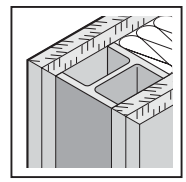

4.3
1000
≥15
3
4
3-7
1.2c
5
6
7

2E Typ 1

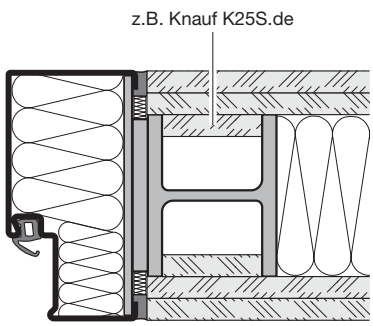




EPDM+
(CR)

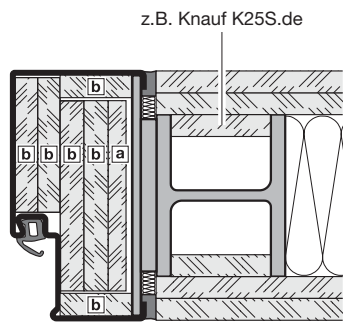


E1.5
max. T30 / EI$_2$30

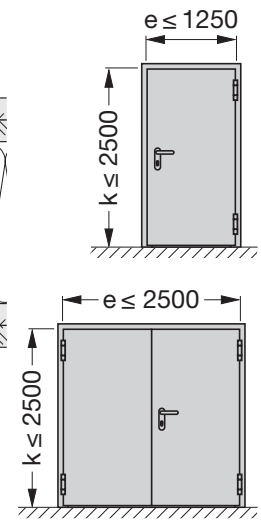


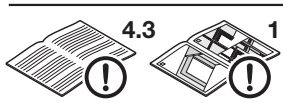
ρ ~ 100 kg/m³
A (EN 13501-1)
z.B. Isover BSP100

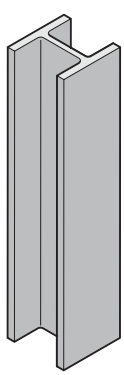
E1.6
max. T90 / EI$_2$90

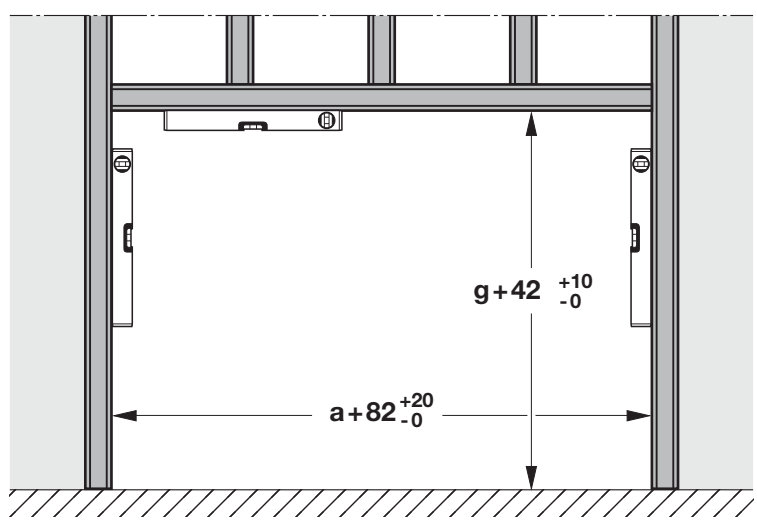


a DF-9,5-EN 520
b DF-12,5-EN 520

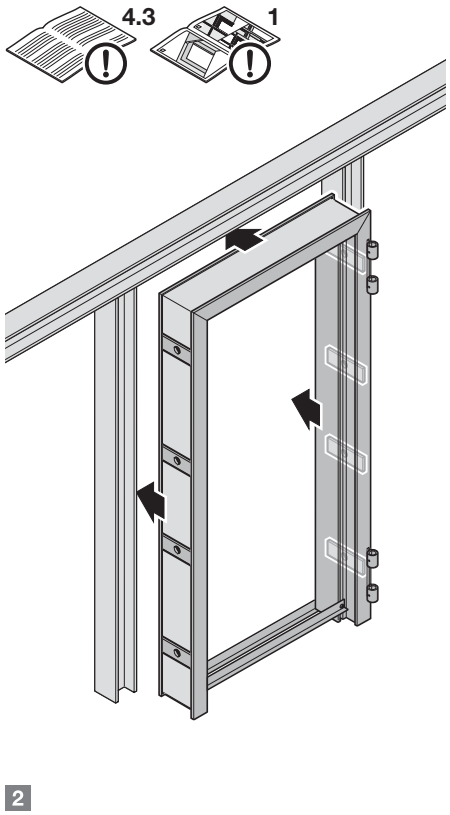




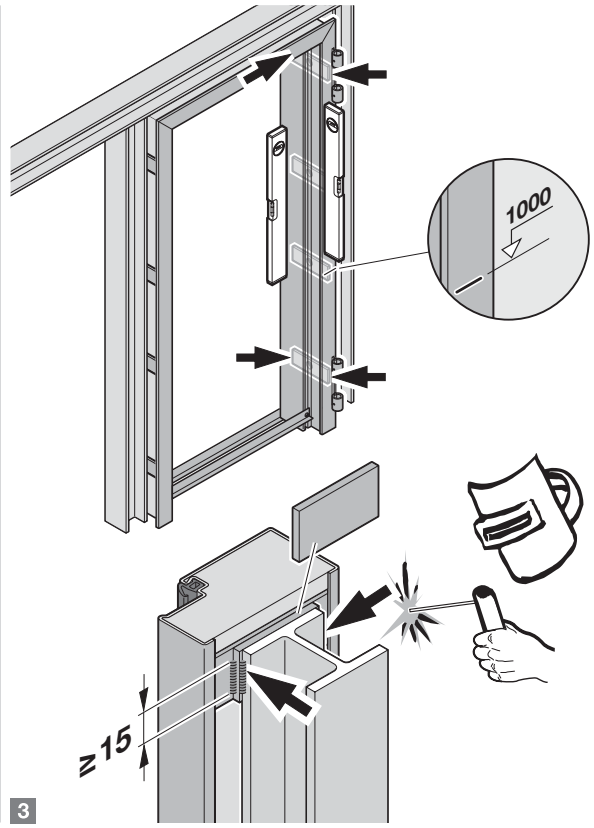




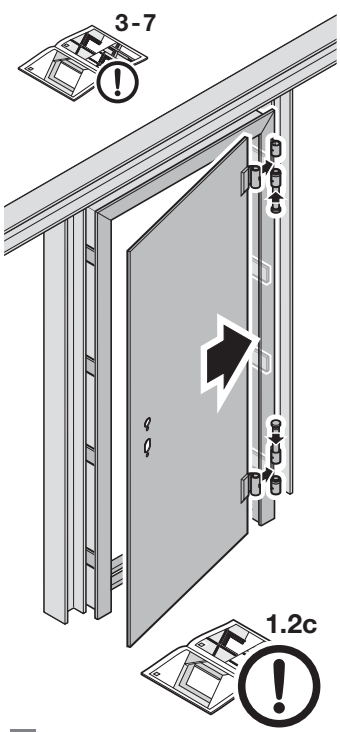
1



2



3



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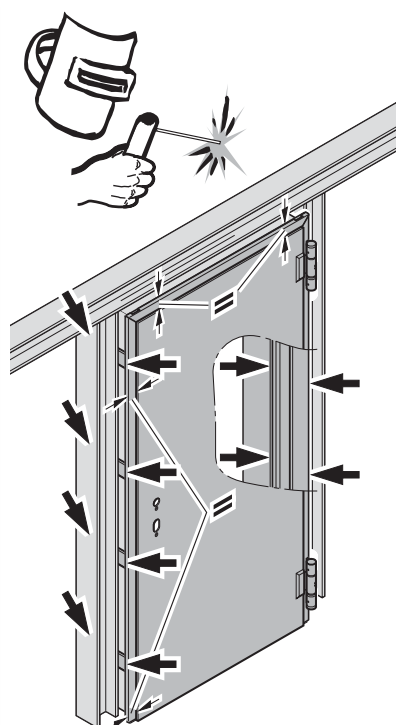

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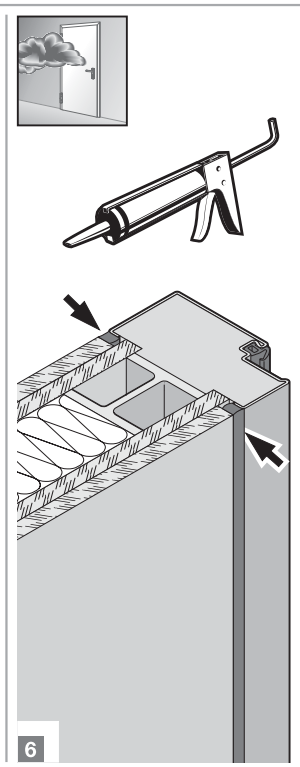
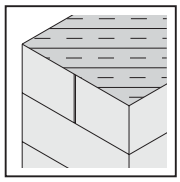
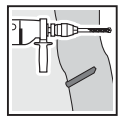
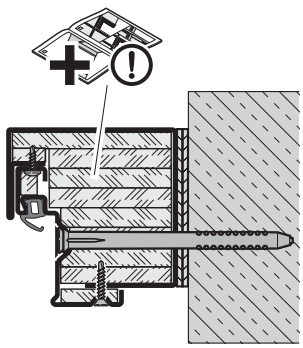


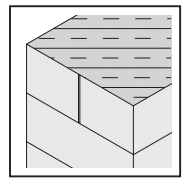
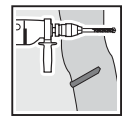
6

2E Typ 2

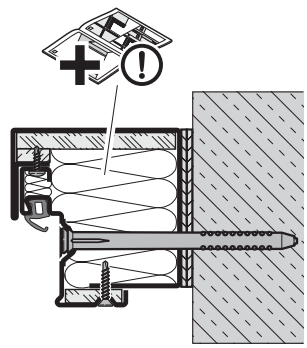



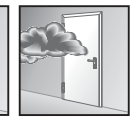
E2.1
max. T90 / EI$_2$90

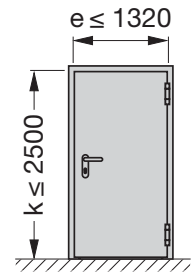


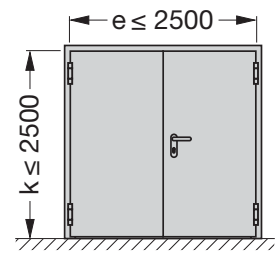



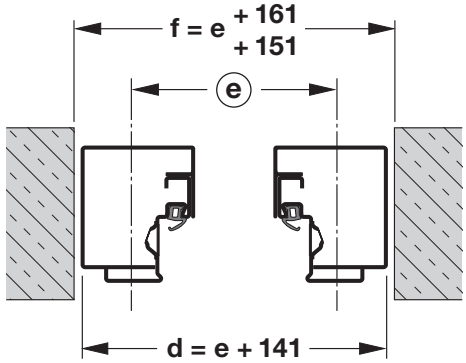
E2.2
max. T30 / EI$_2$30

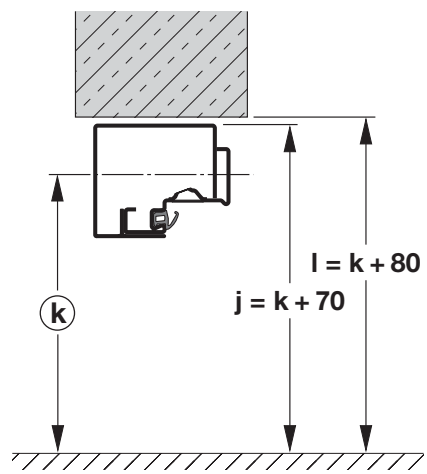






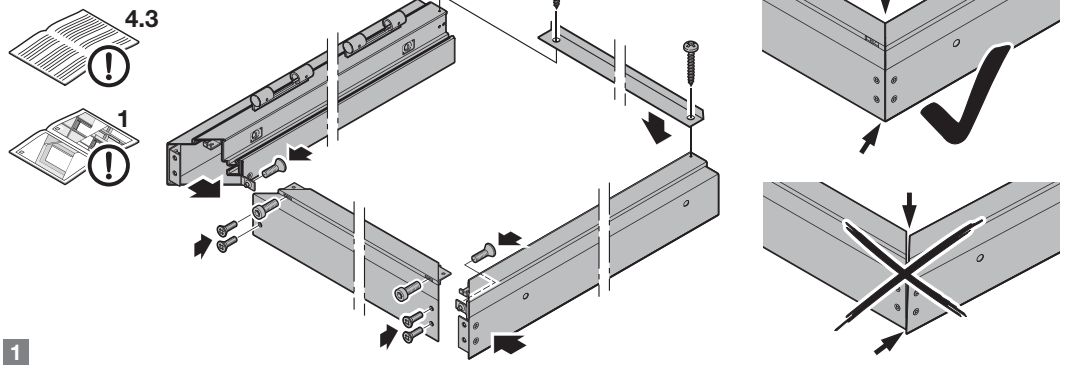




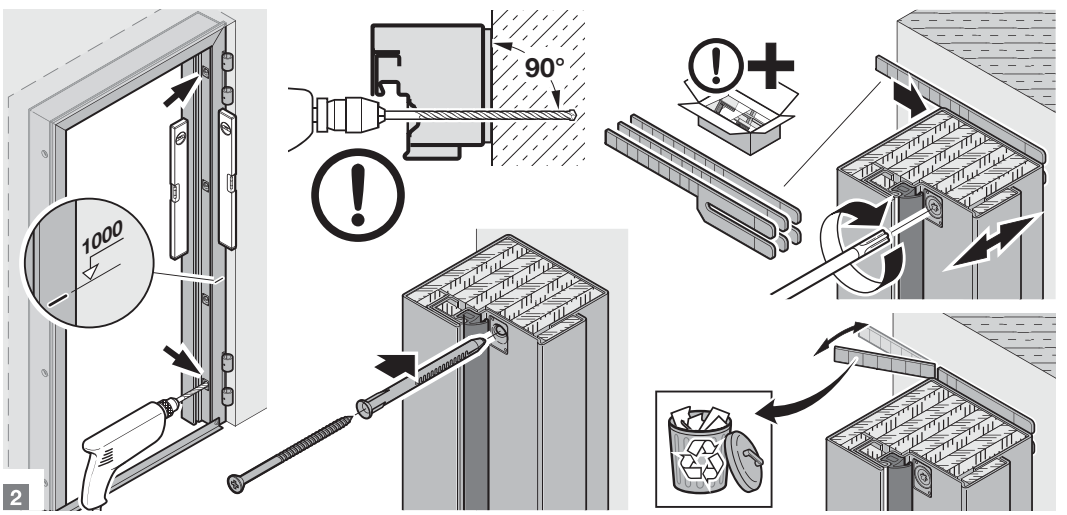


→ E2.1 / E2.2 1 2 3 …

E2.1 / E2.2



1



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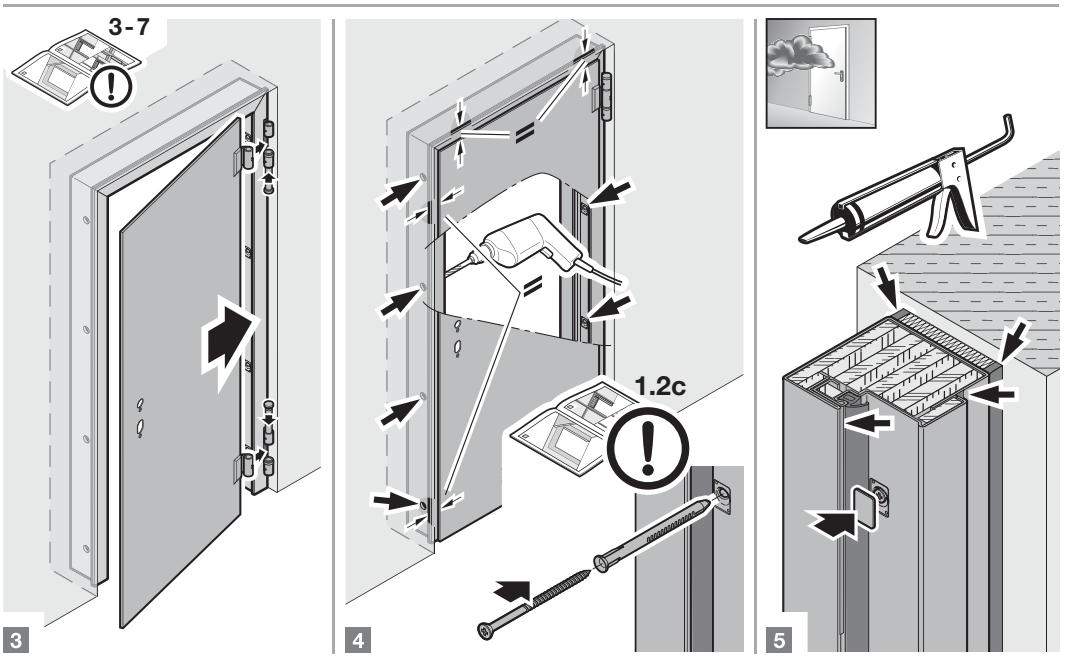
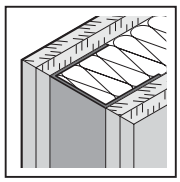


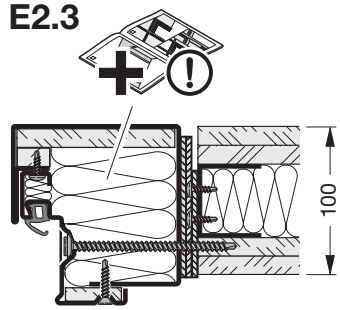
3 4 5

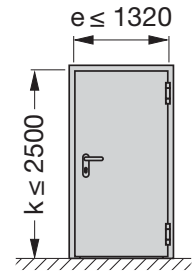
2E **Typ 2**

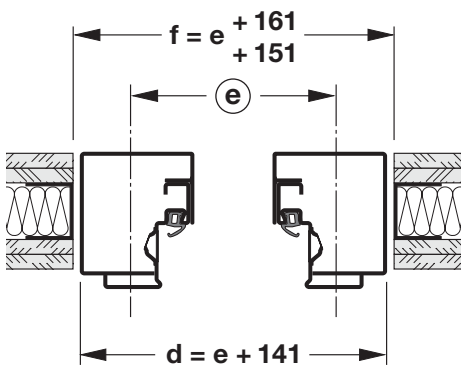
max. T30 / EI$_2$30

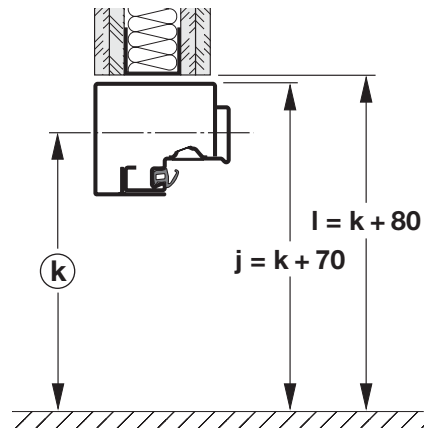


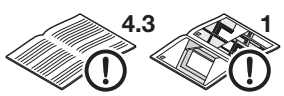
E2.3

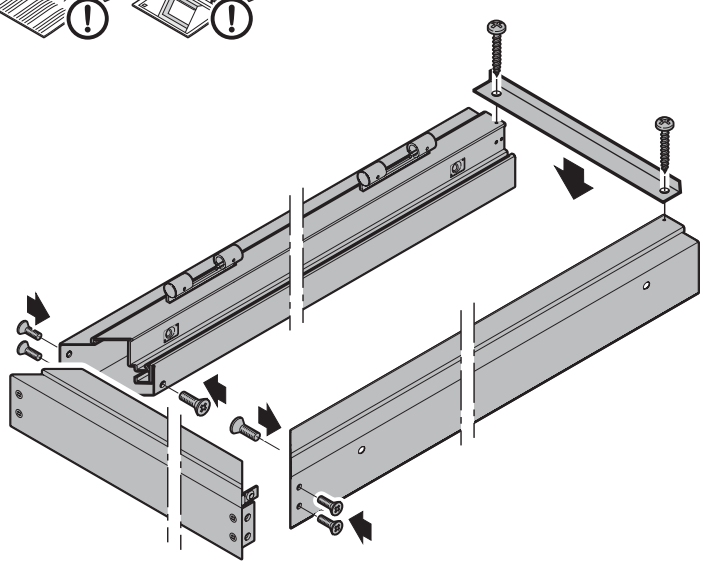


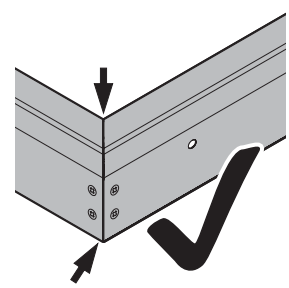


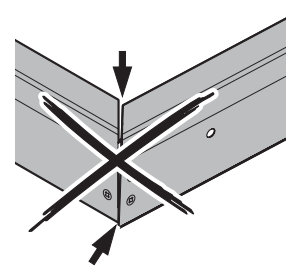




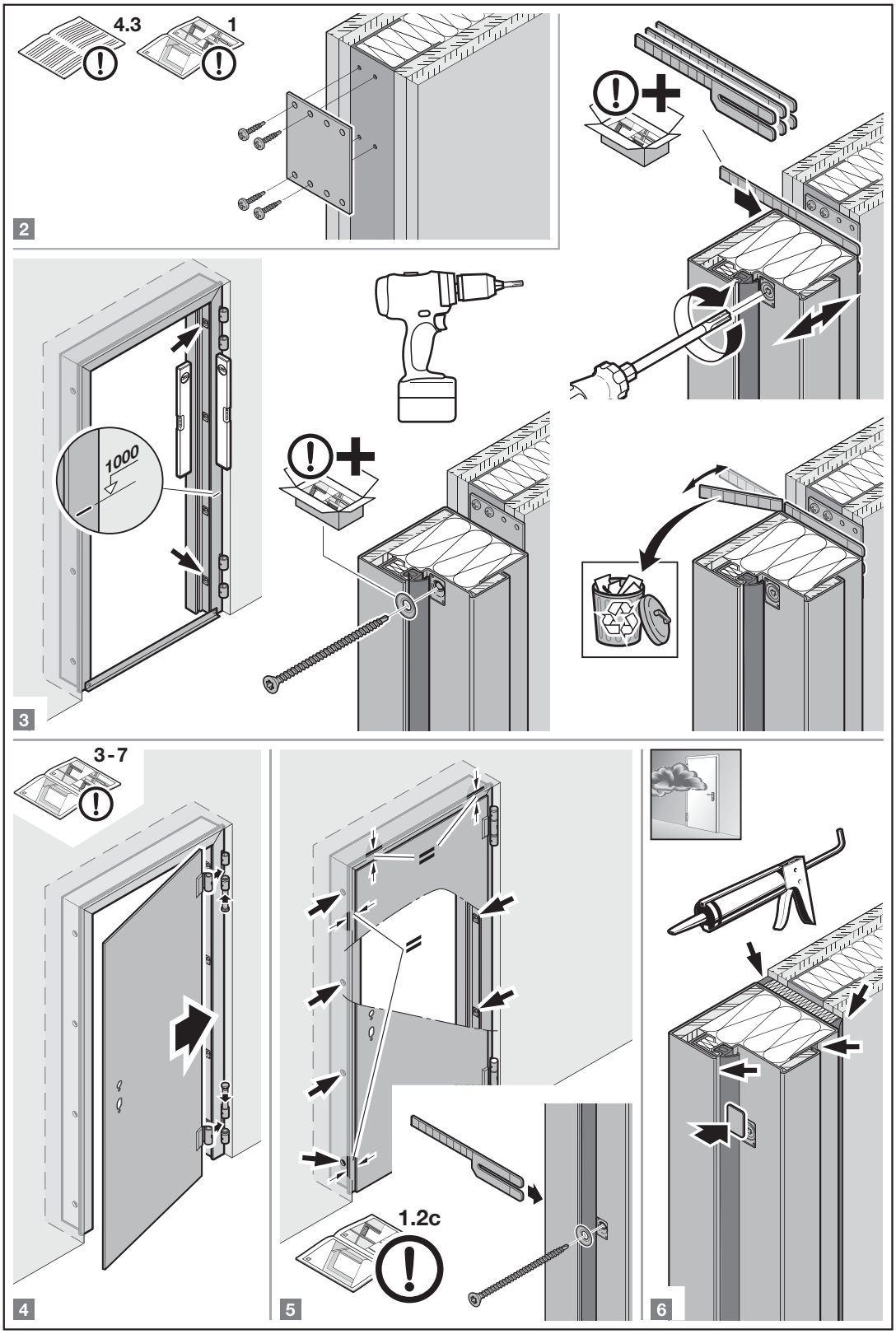


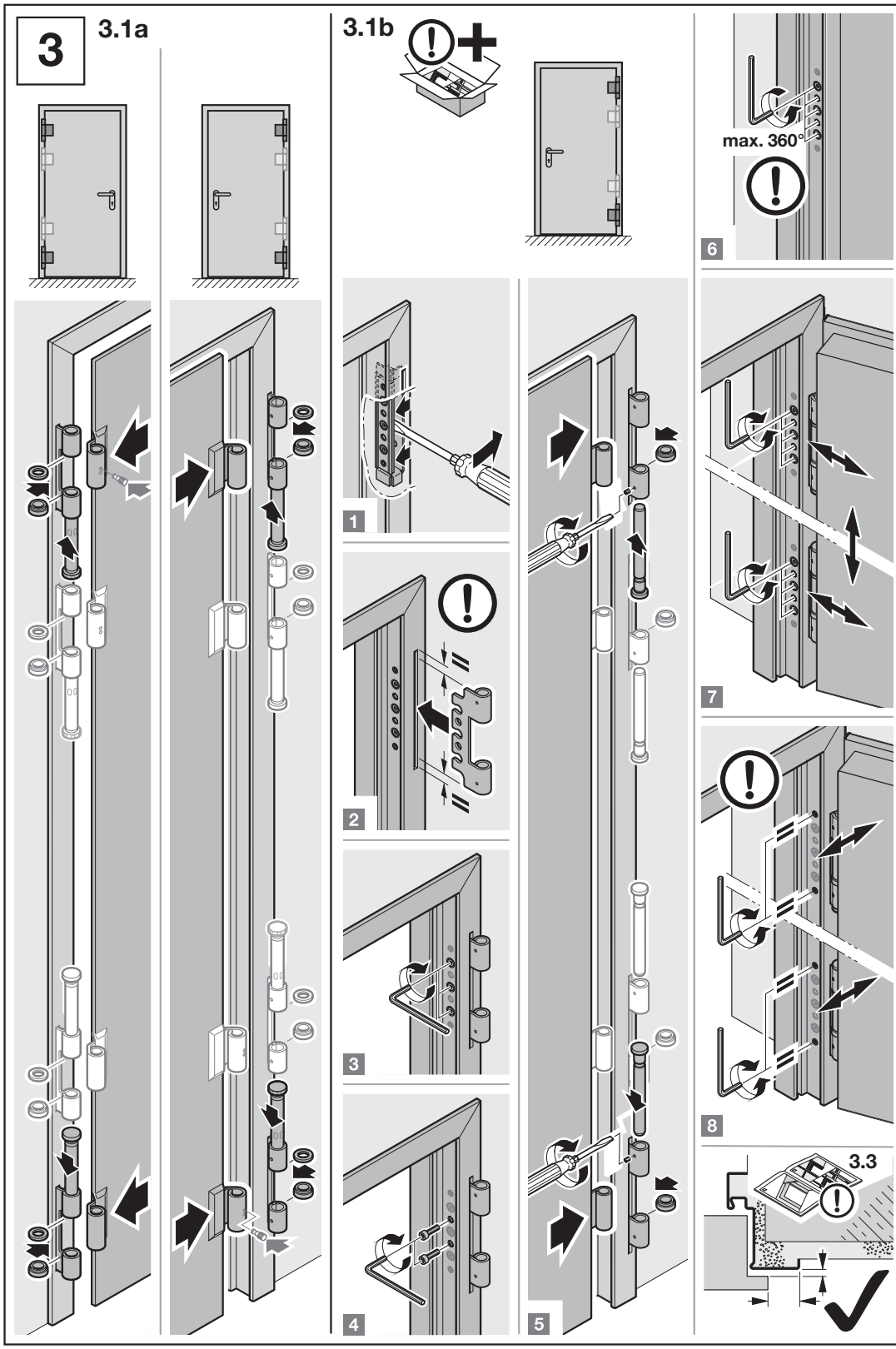






1

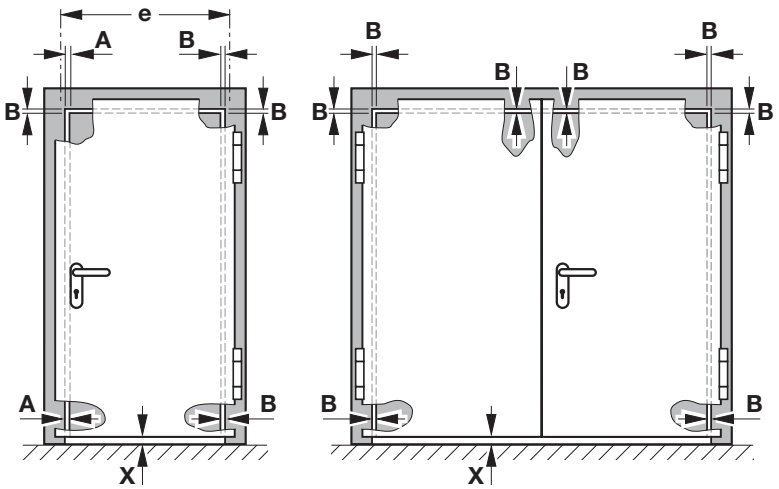

4.3
1
2
1000
3
3-7
4
1.2c
5
6

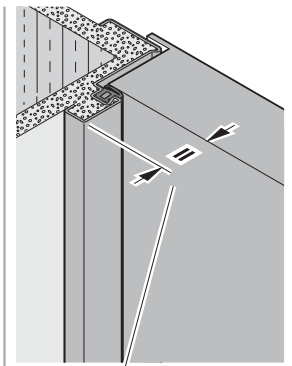

3
3.1a
3.1b
max. 360°
1
2
3
4
5
6
7
8
3.3

3.2 4.2

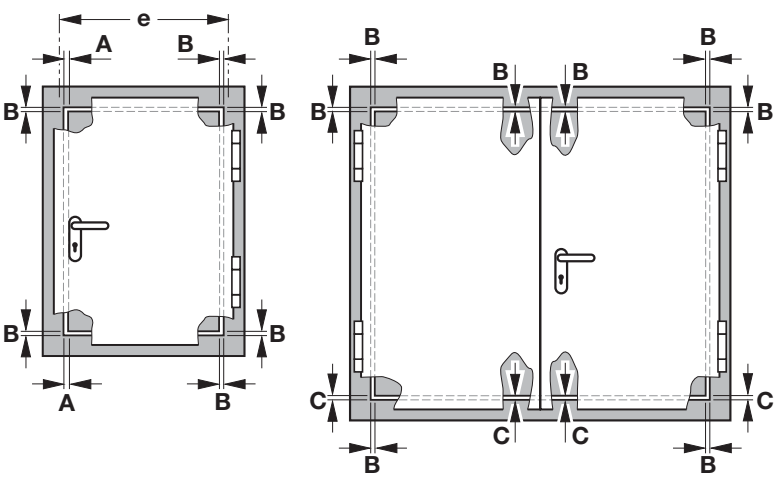
e	A
≤ 749	6^{+1}_{-2}
750 - 874	6^{+1}_{-2}
≥ 875	5^{+1}_{-2}

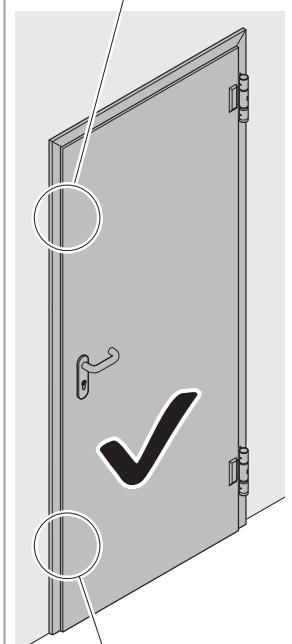
B	C max. T30	C T60, T90, T120
4±2	4±2	10±2

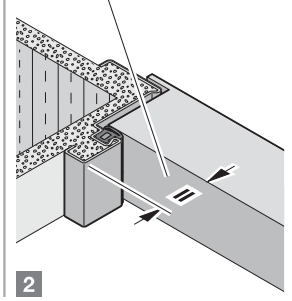




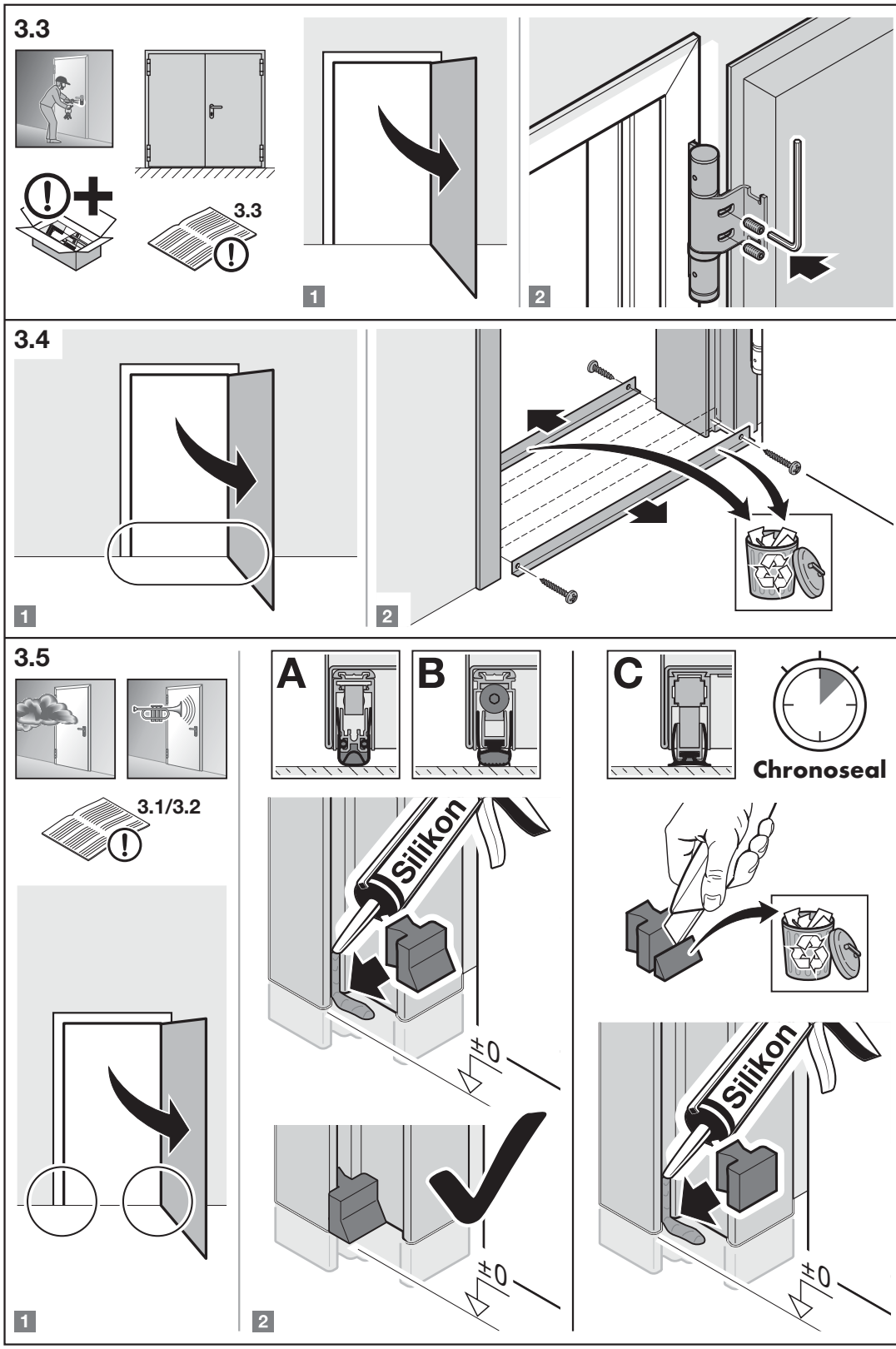
X=10±5 | X=10$^{+2}_{-5}$ | X=10−5



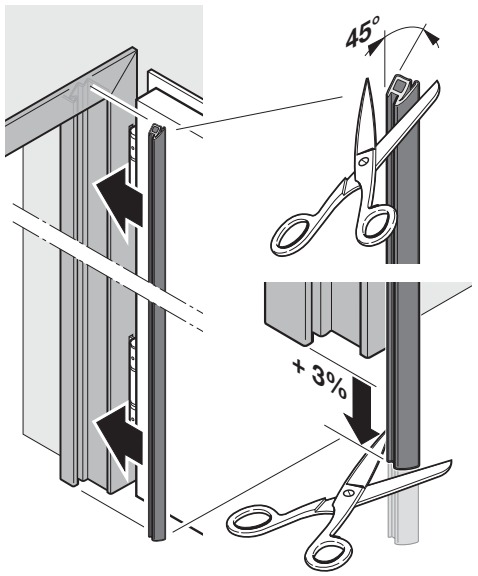




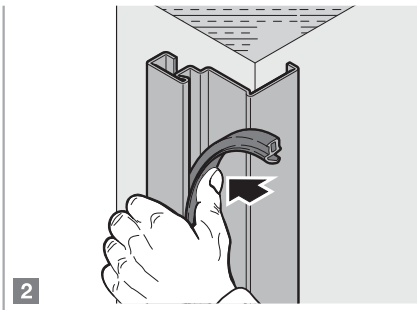
1 2


3.3
3.3
1
2
3.4
1
2
3.5
3.1/3.2
A
B
C
Chronoseal
Silikon
Silikon
1
2

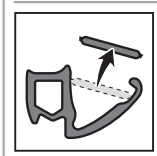
3.6a

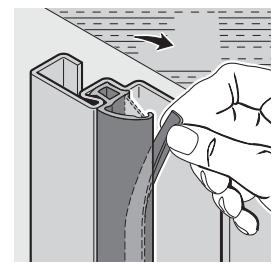


1



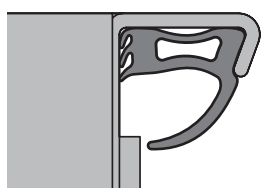
2

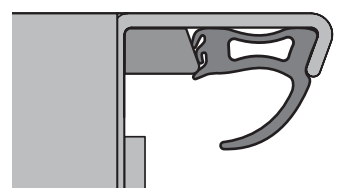


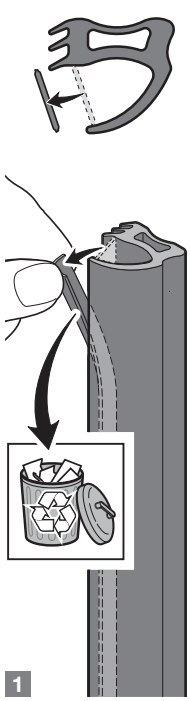


3

3.6b







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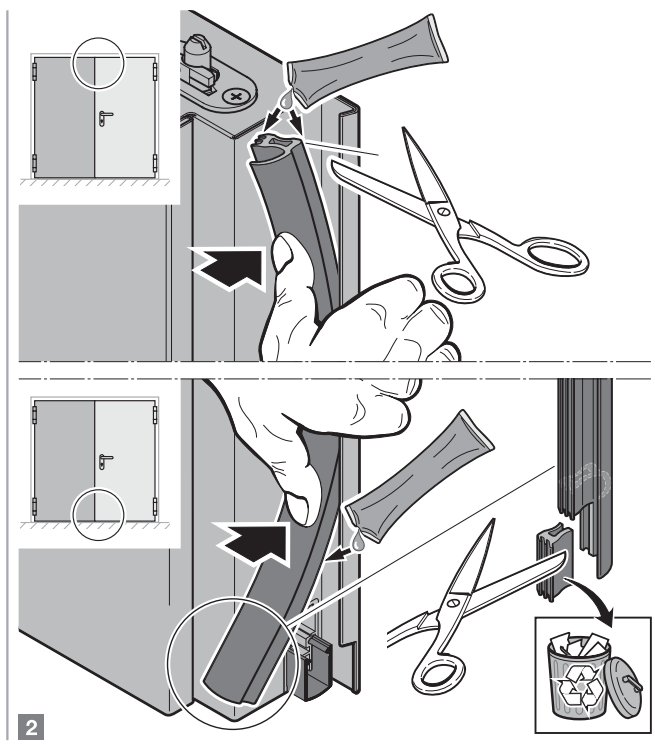
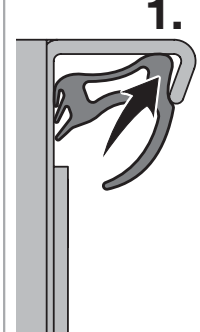
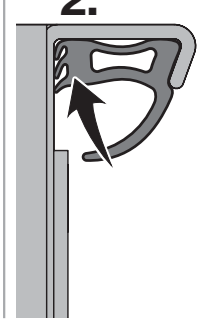
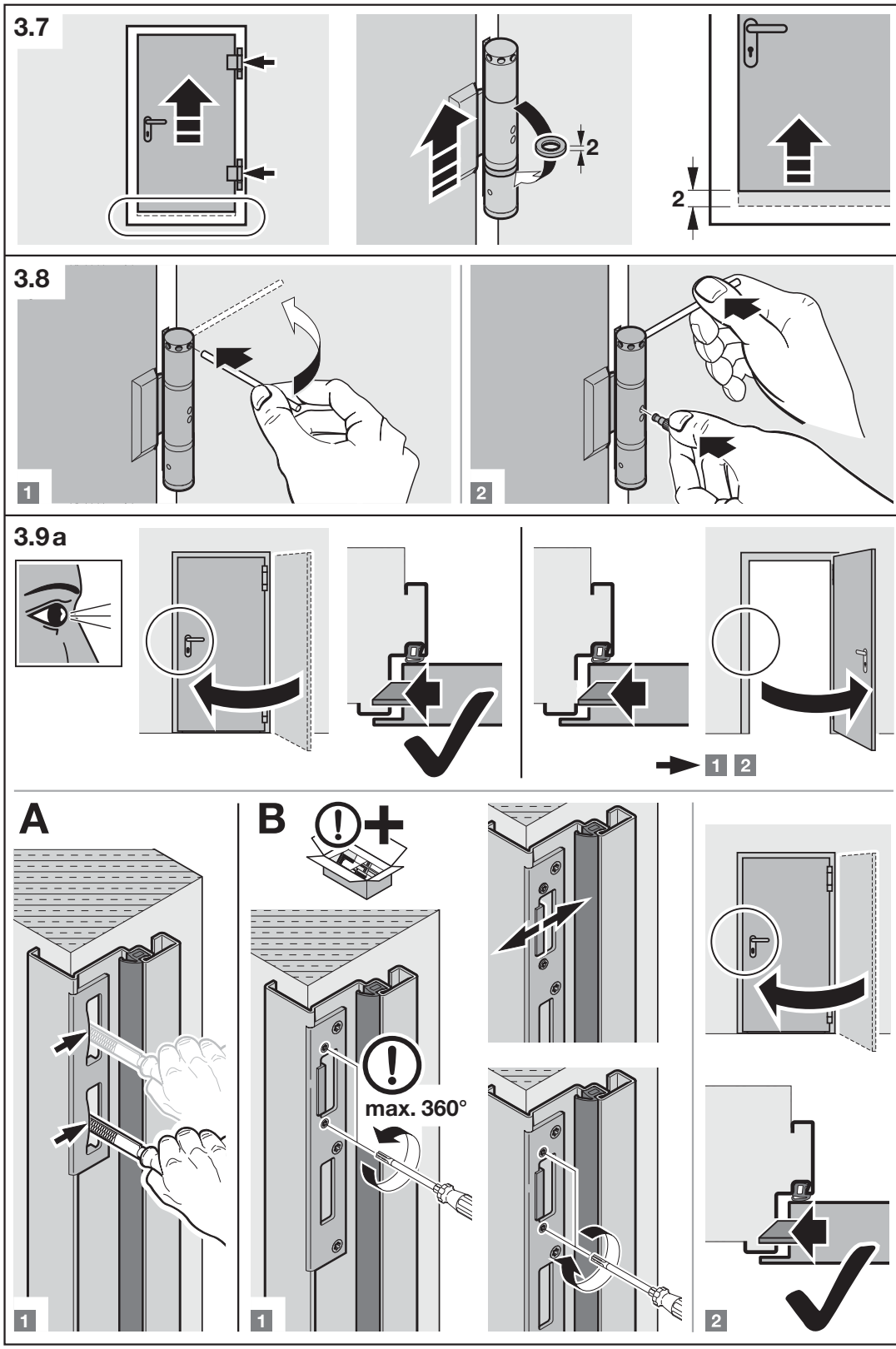


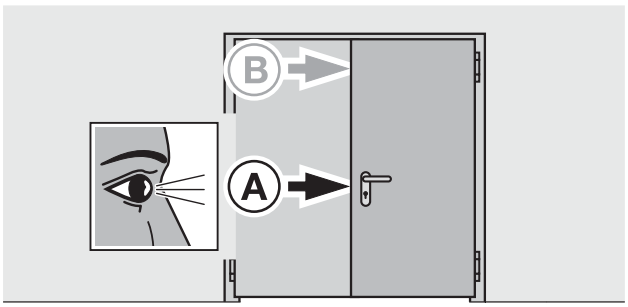
2

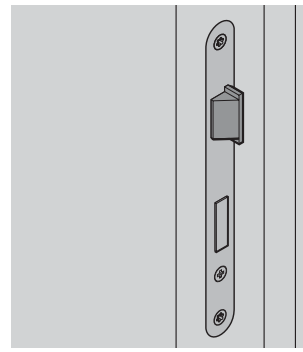


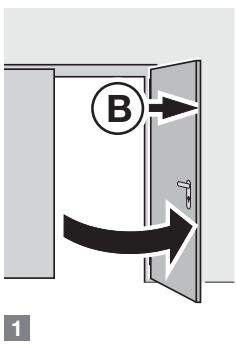



3.7
2
2
3.8
1
2
3.9a
1 2
A
B
max. 360°
1
1
2

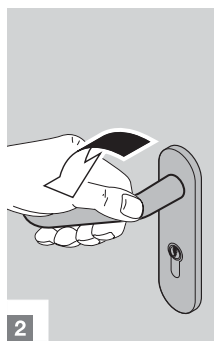
3.9b H16-2 G / H_90 F-2







1



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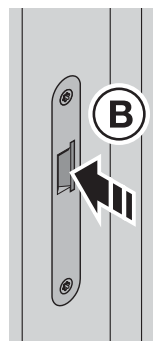
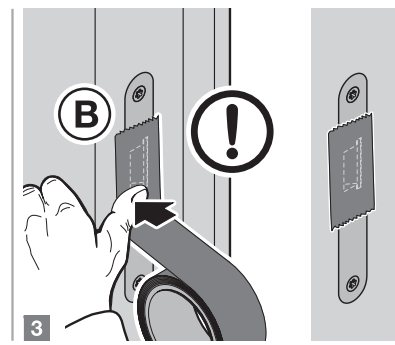
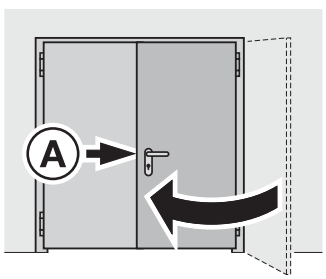
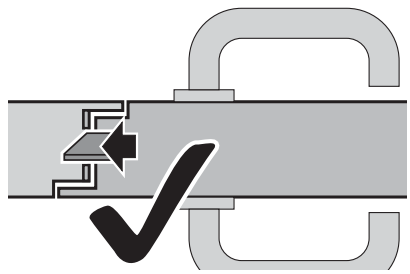




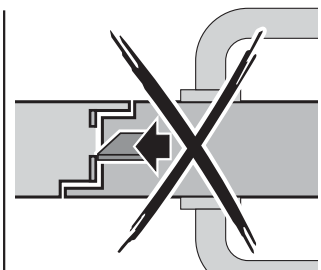
3



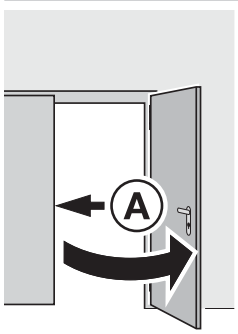
4a



→ 7 8



4b → 5 6 7 8



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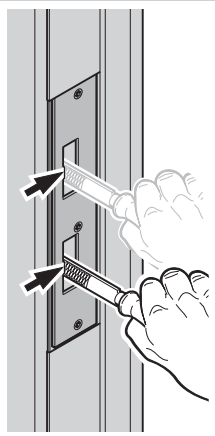

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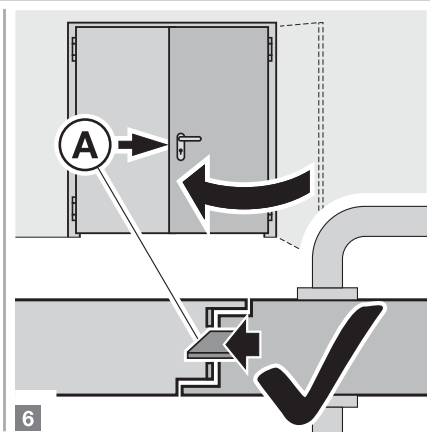
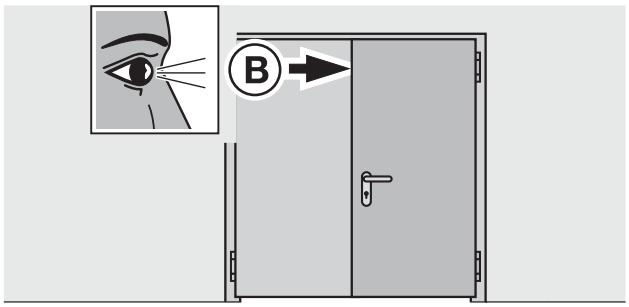


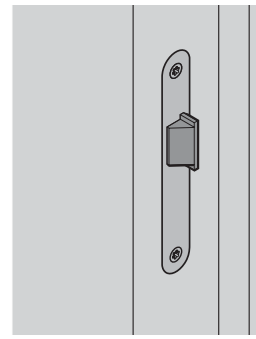
7

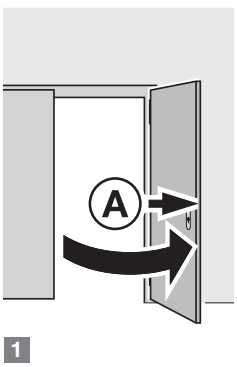
8

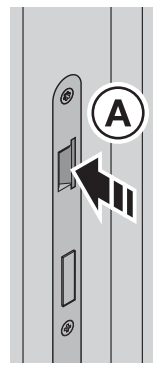
→ 3.9c

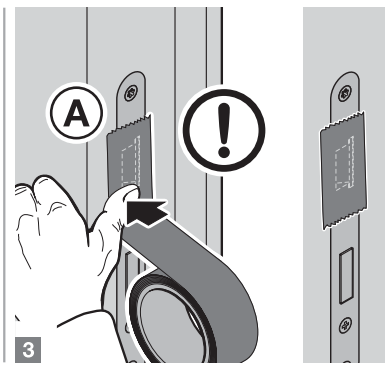
3.9c H16-2 G / H_90 F-2

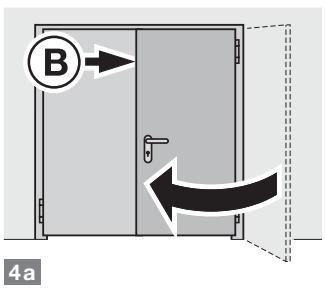


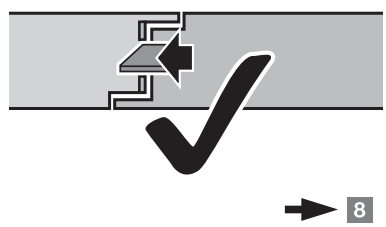


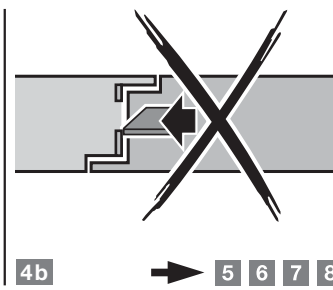


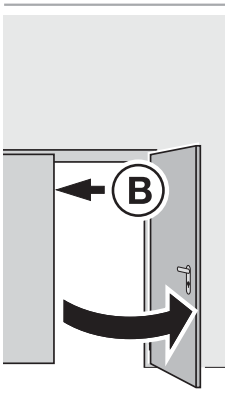


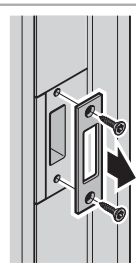


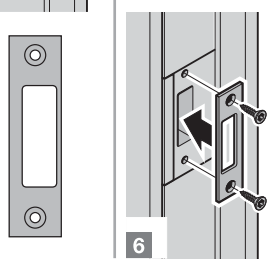


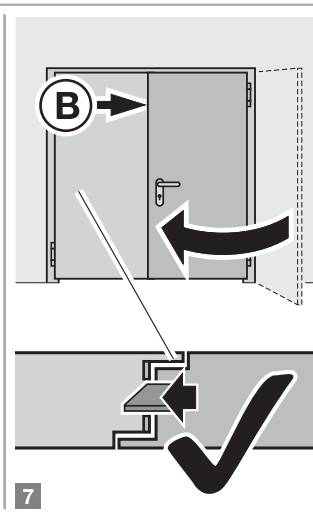




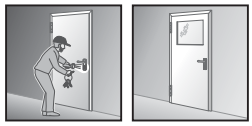


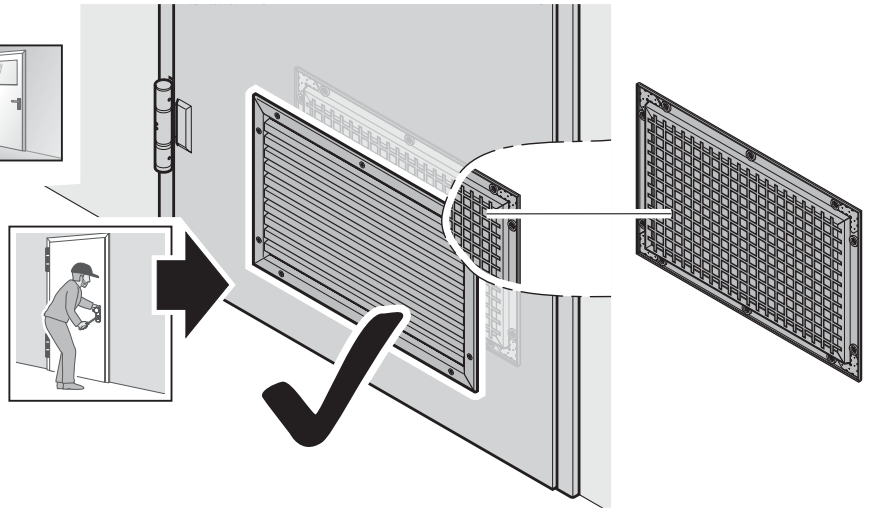




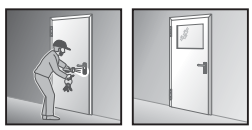


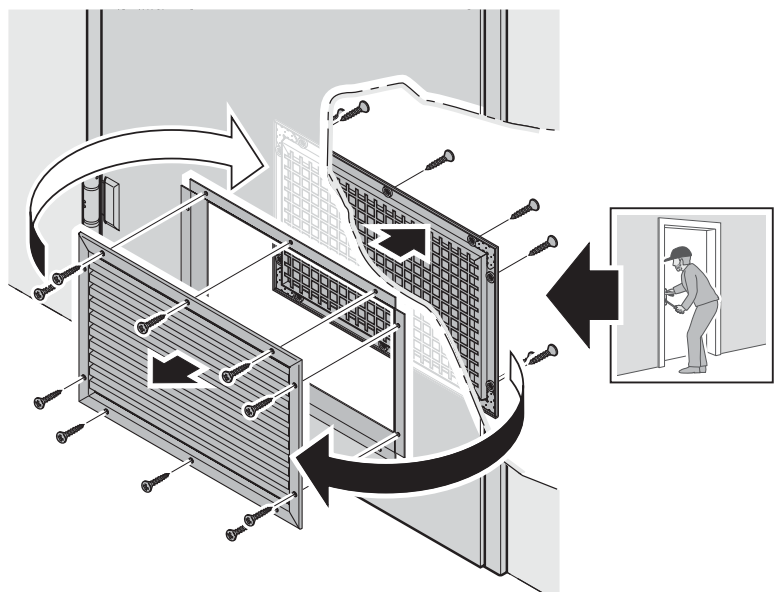
3.10a



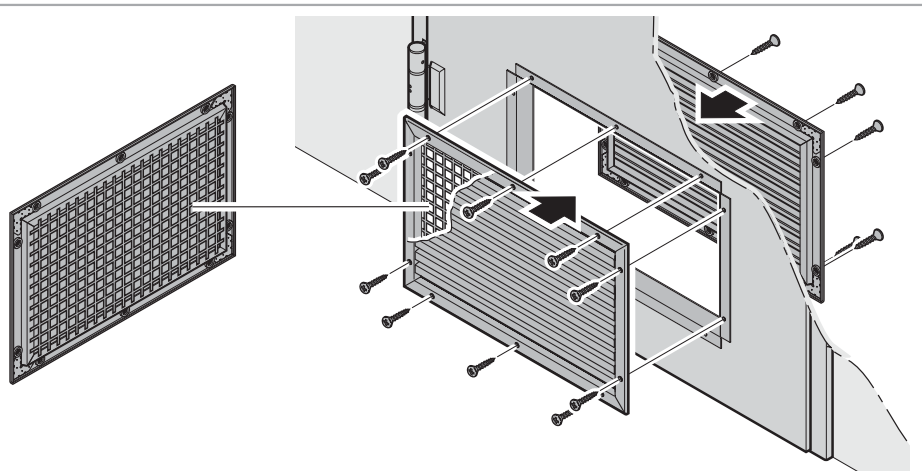


3.10b



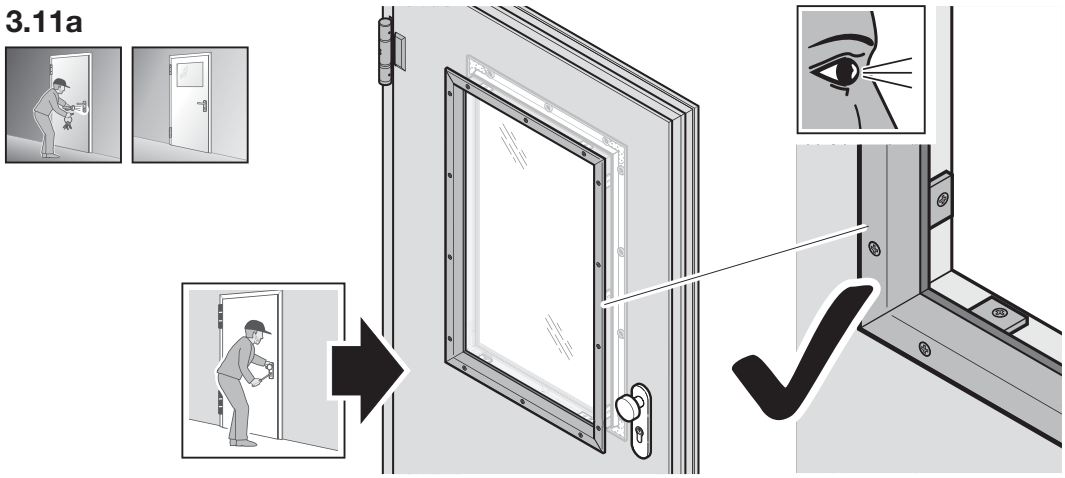


1

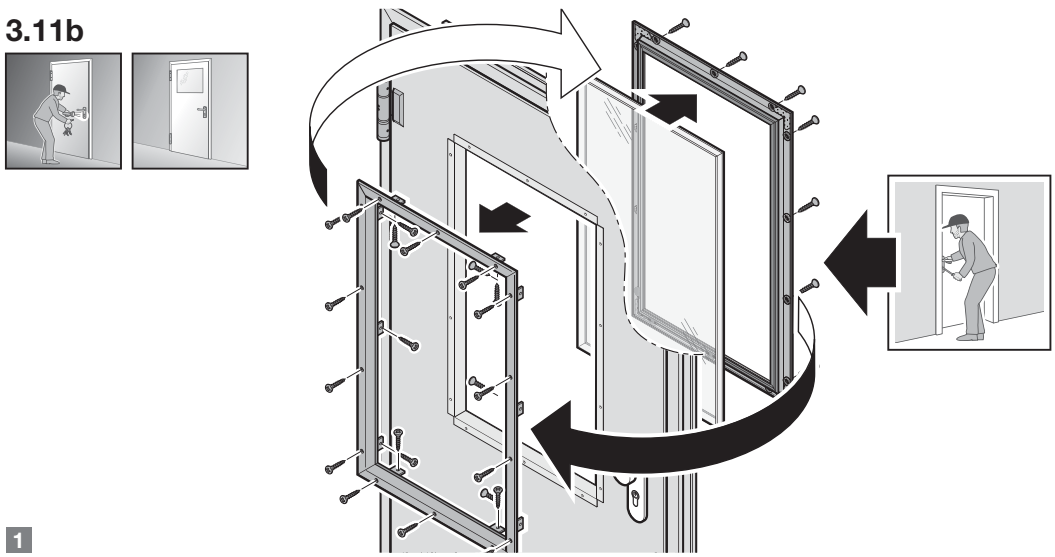


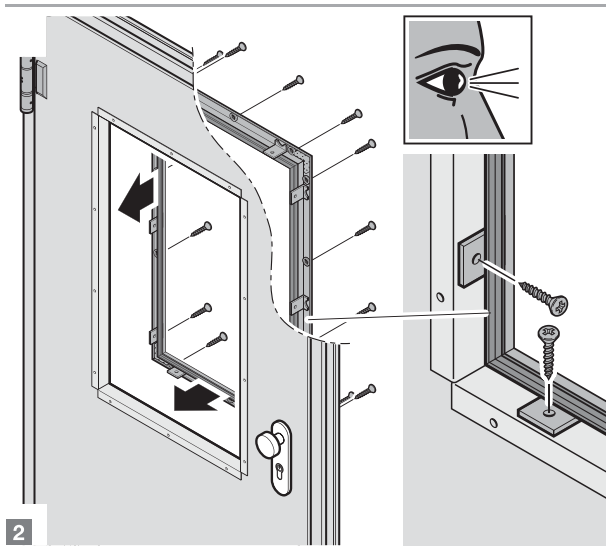
2

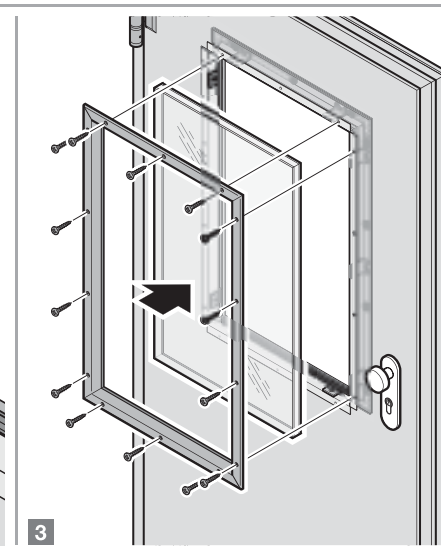
3.11a

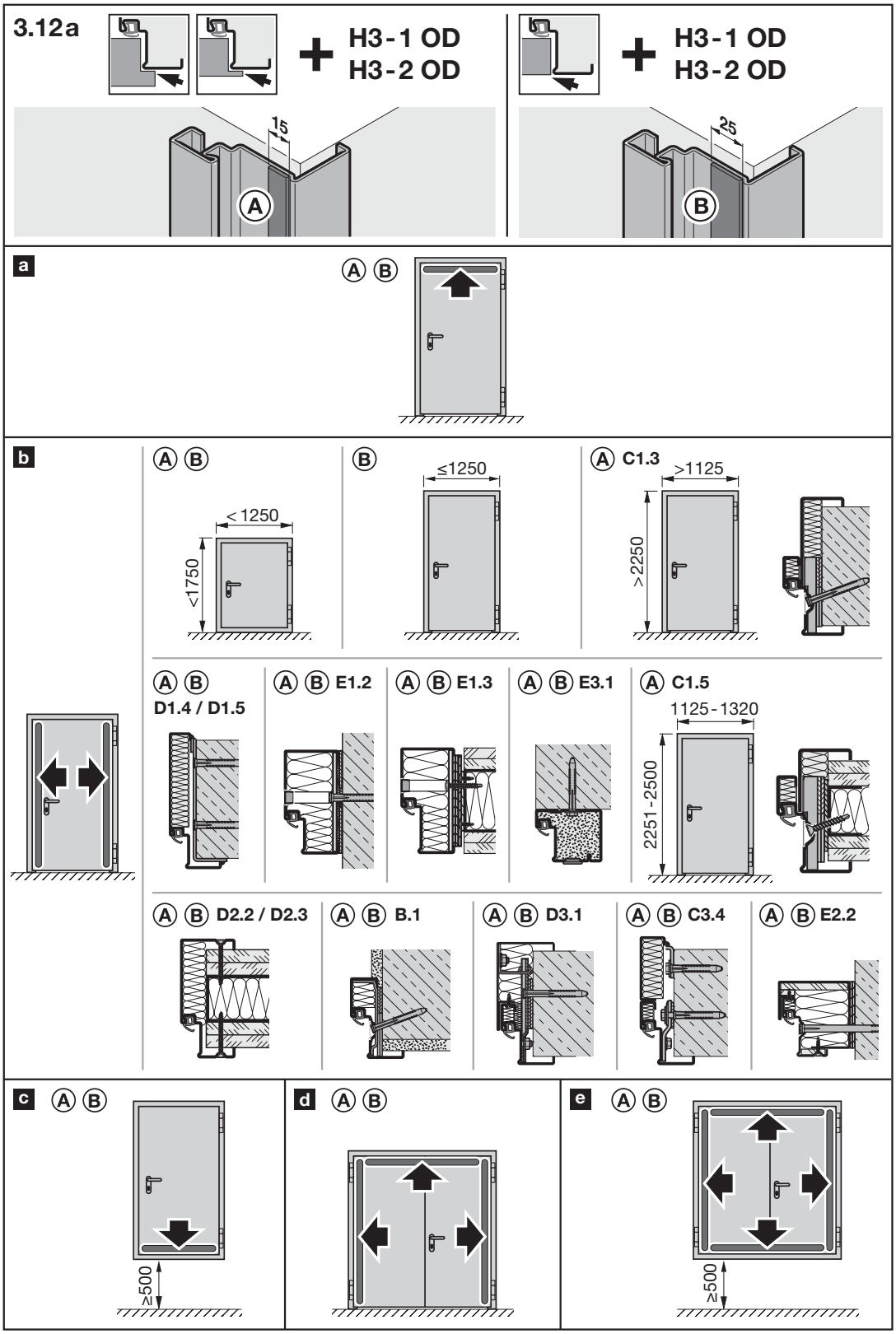


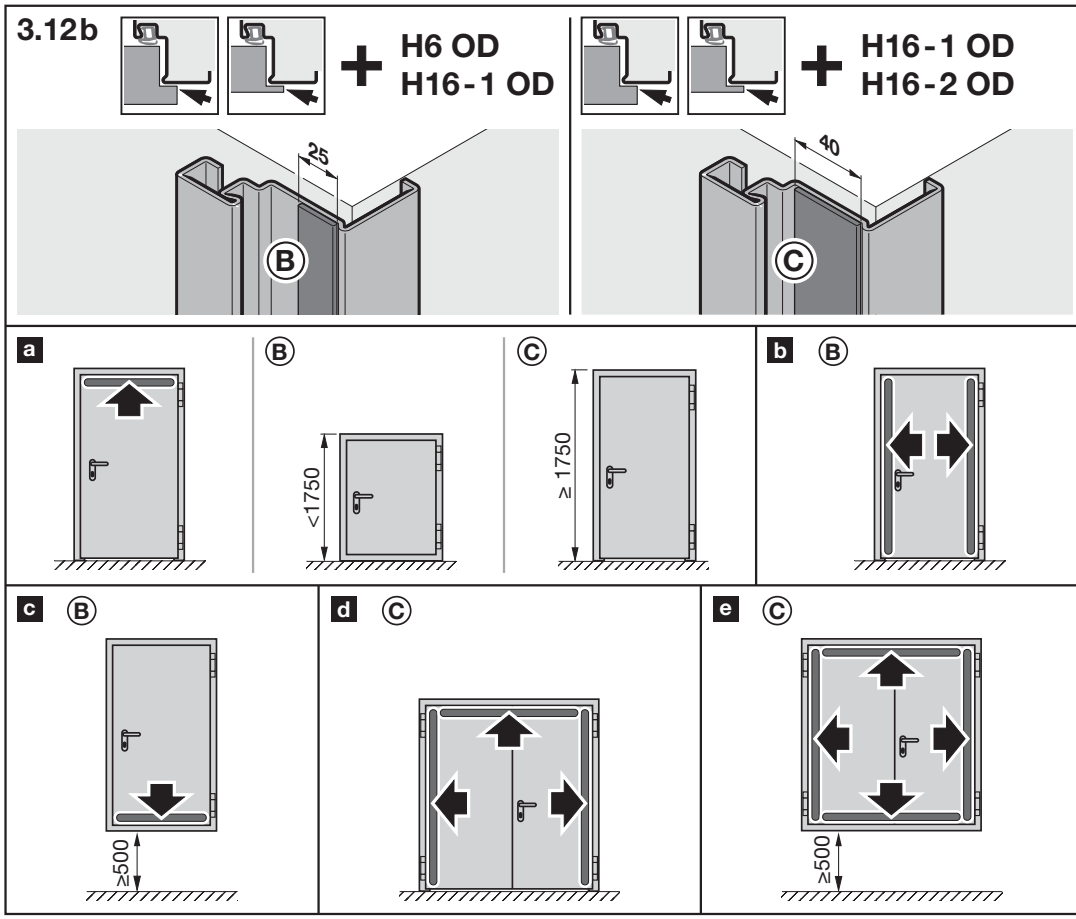
3.11b

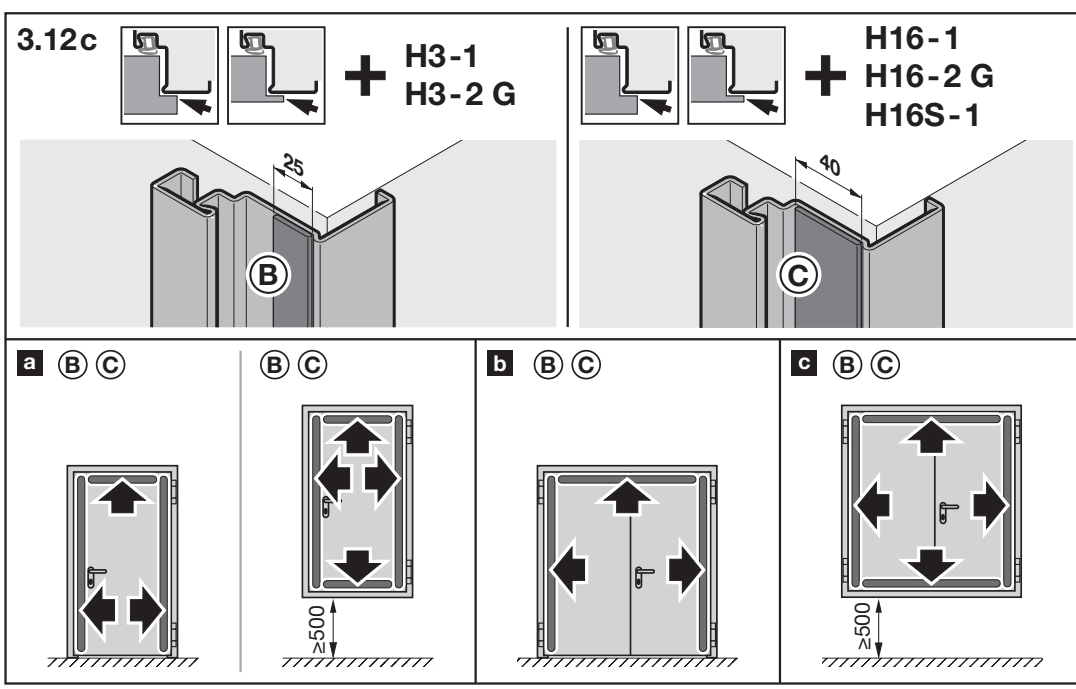




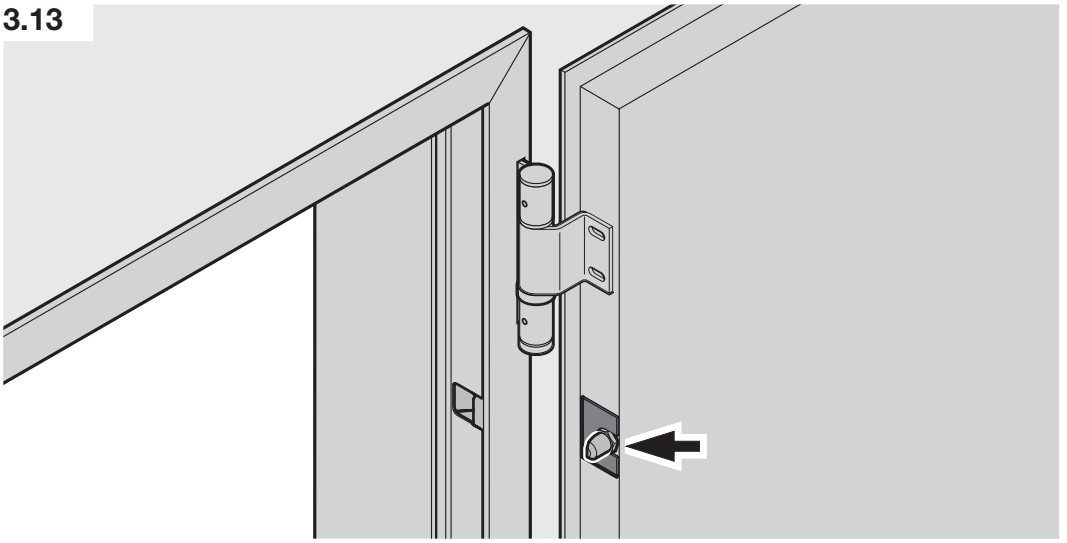



3.12a
H3-1 OD
H3-2 OD
H3-1 OD
H3-2 OD
15
25
A
B
a
A B
b
A B
< 1250
<1750
B
≤1250
A C1.3
>1125
>2250
A B
D1.4 / D1.5
A B E1.2
A B E1.3
A B E3.1
A C1.5
1125-1320
2251-2500
A B D2.2 / D2.3
A B B.1
A B D3.1
A B C3.4
A B E2.2
c
A B
≥500
d
A B
e
A B
≥500

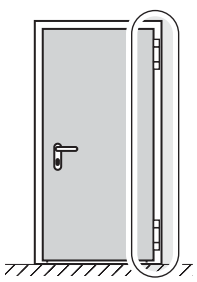

3.12b
+ H6 OD
H16-1 OD
+ H16-1 OD
H16-2 OD
25
40
B
C
a
B
C
b B
<1750
≥ 1750
c B
d C
e C
≥500
≥500


3.12c
+ H3-1
H3-2 G
+ H16-1
H16-2 G
H16S-1
25
40
B
C
a B C
B C
b B C
c B C
≥500
≥500

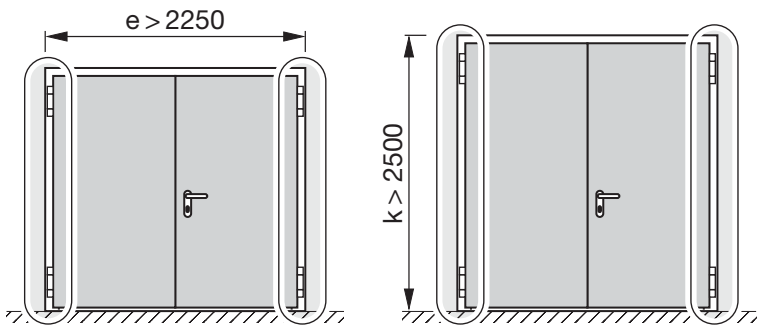
3.13



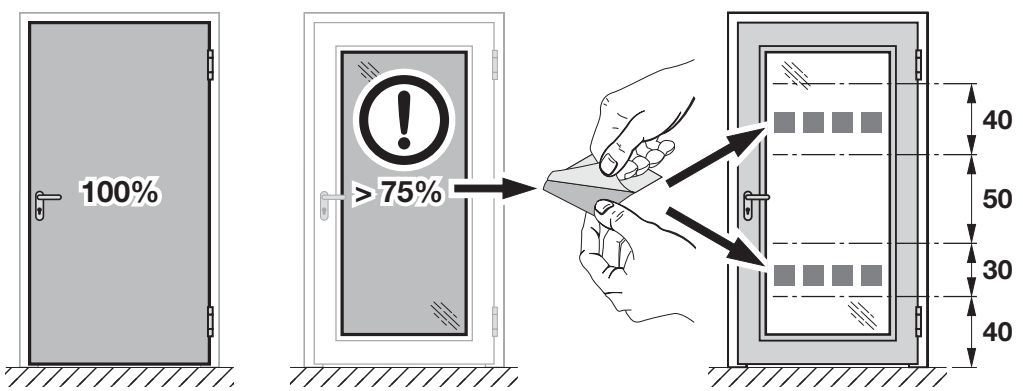
T60-1 / H_60-1
T90-1 / H_90-1

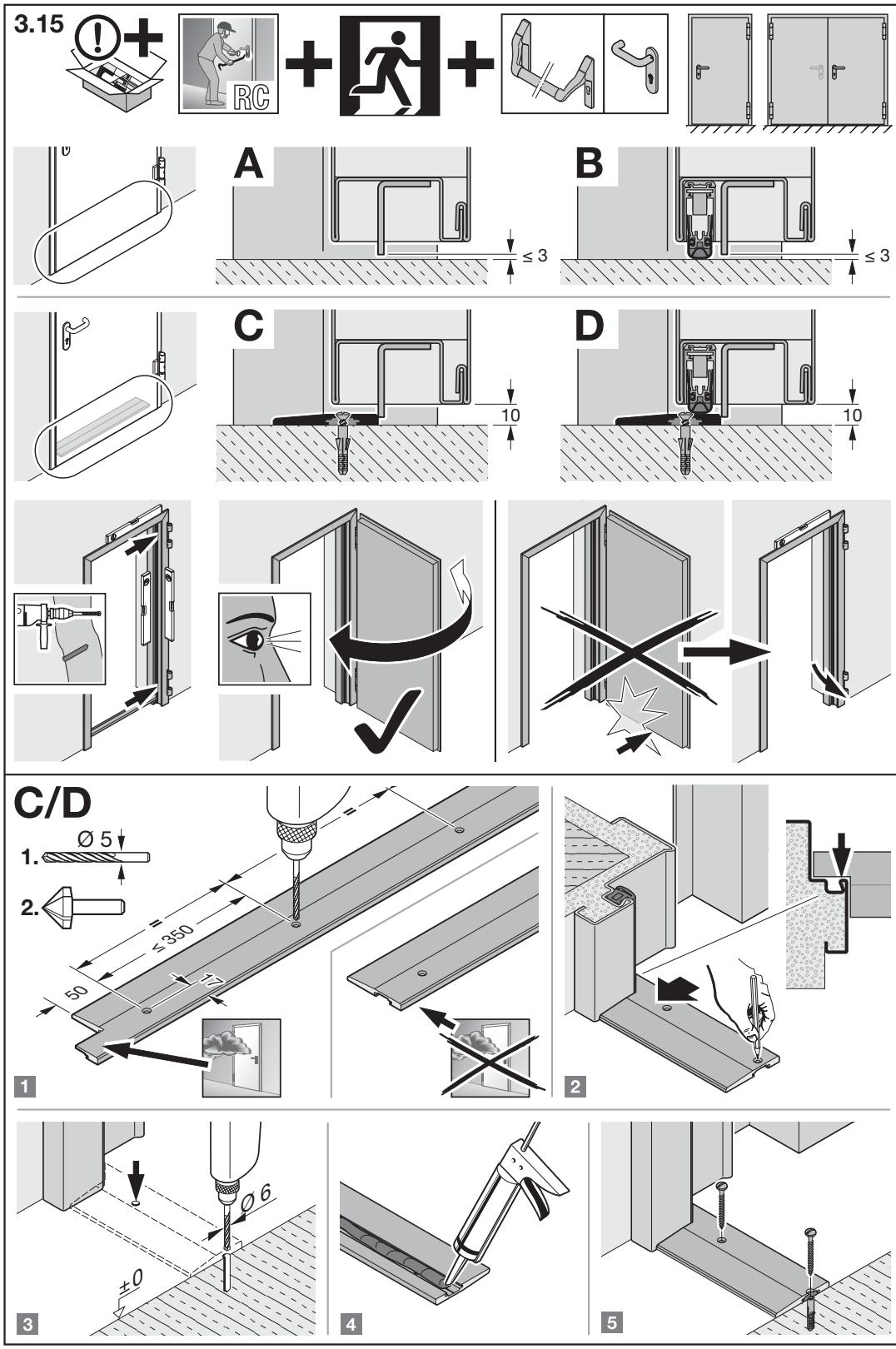


T60-2 / H_60-2
T90-2 / H_90-2

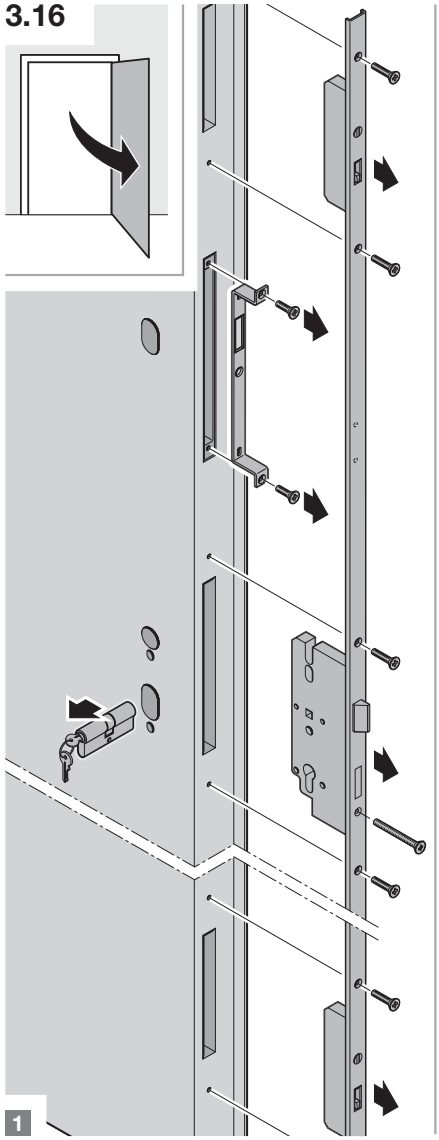


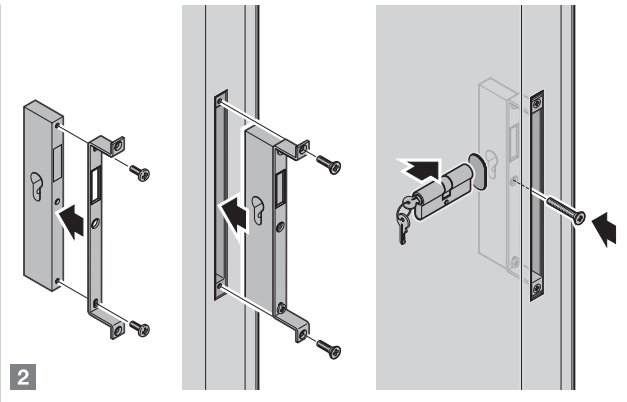
3.14

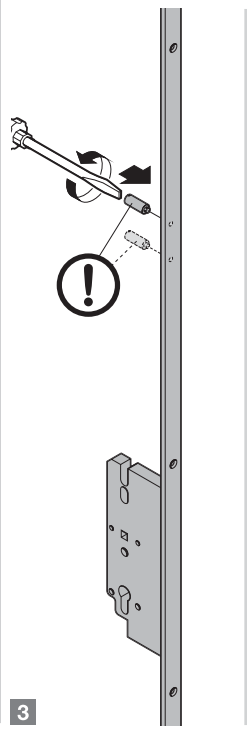


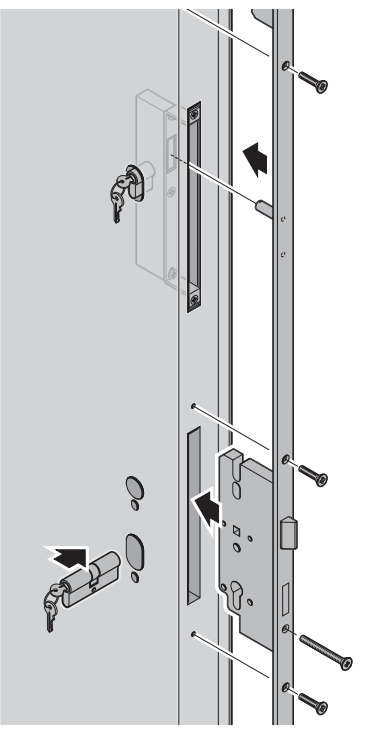

3.15
RC
A
≤ 3
B
≤ 3
C
10
D
10
C/D
1.
Ø 5
2.
≤ 350
50
17
1
2
Ø 6
±0
3
4
5

3.16

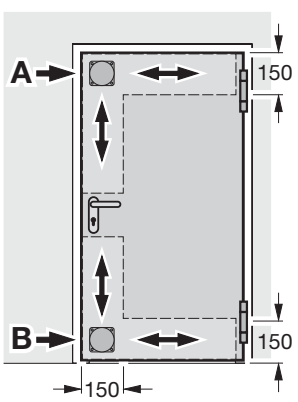


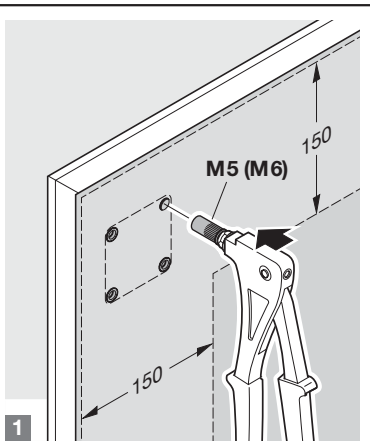


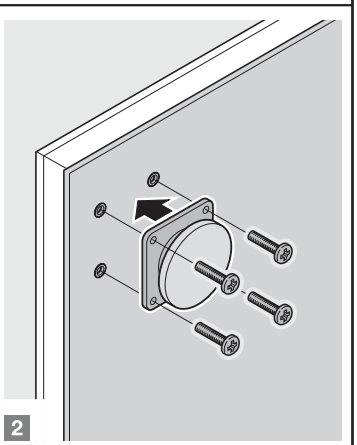


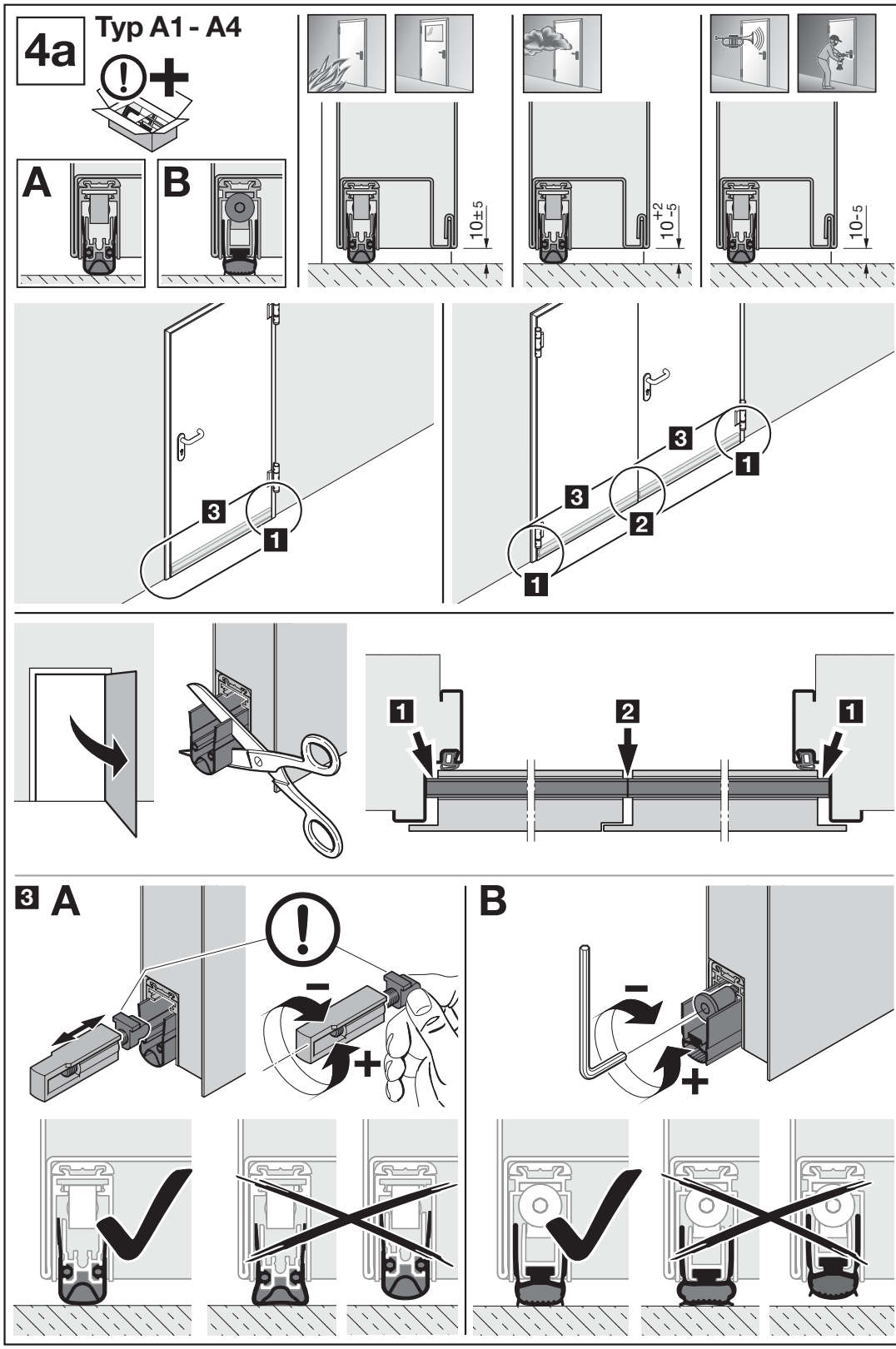


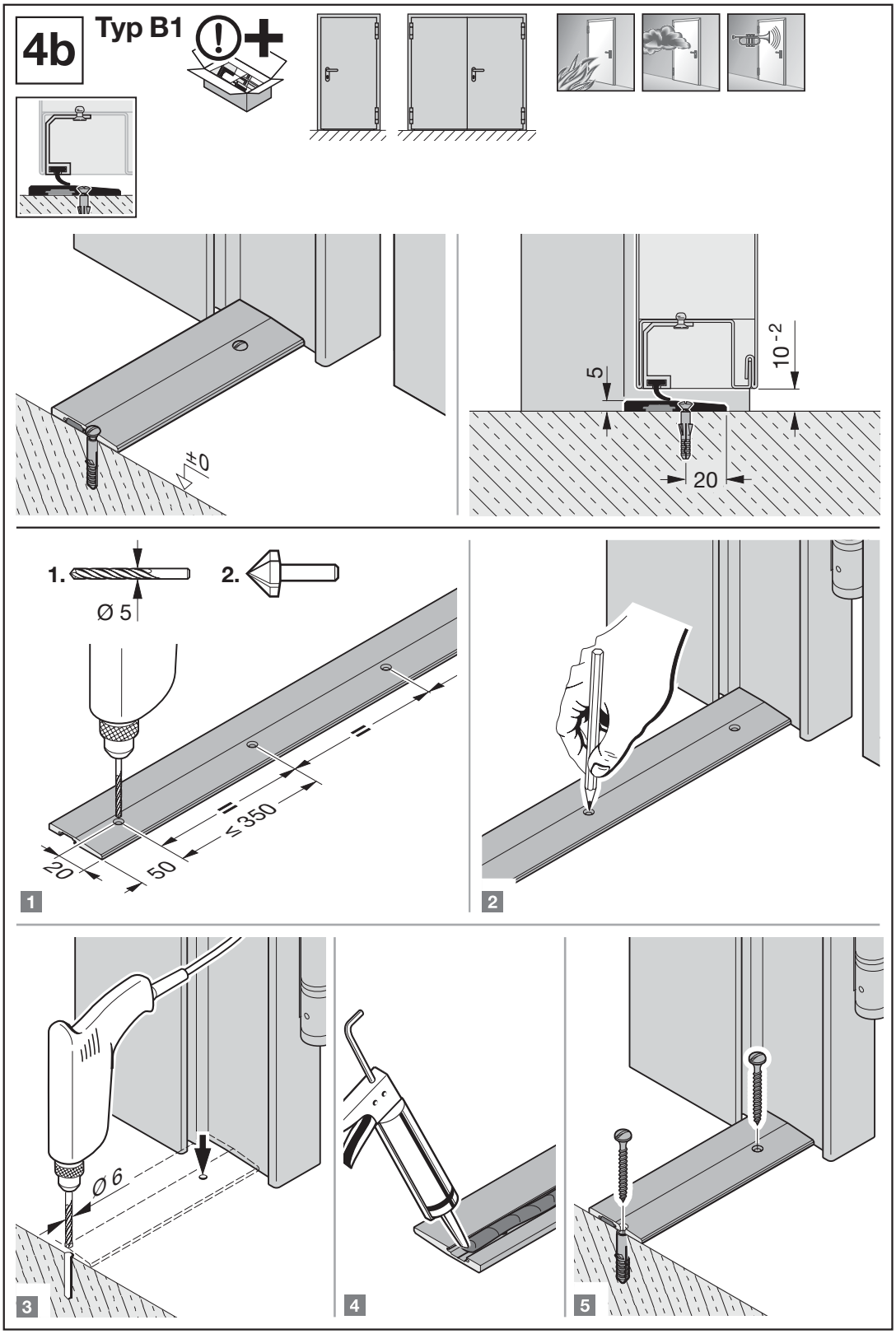
3.17

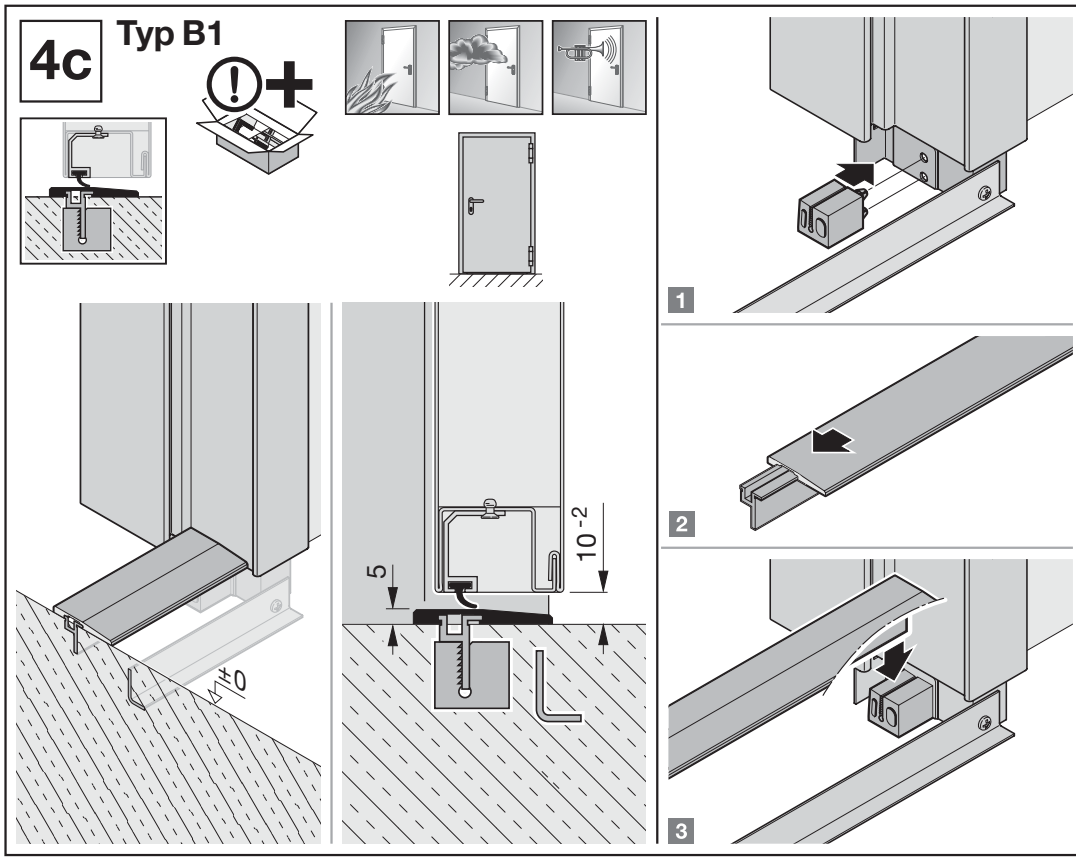


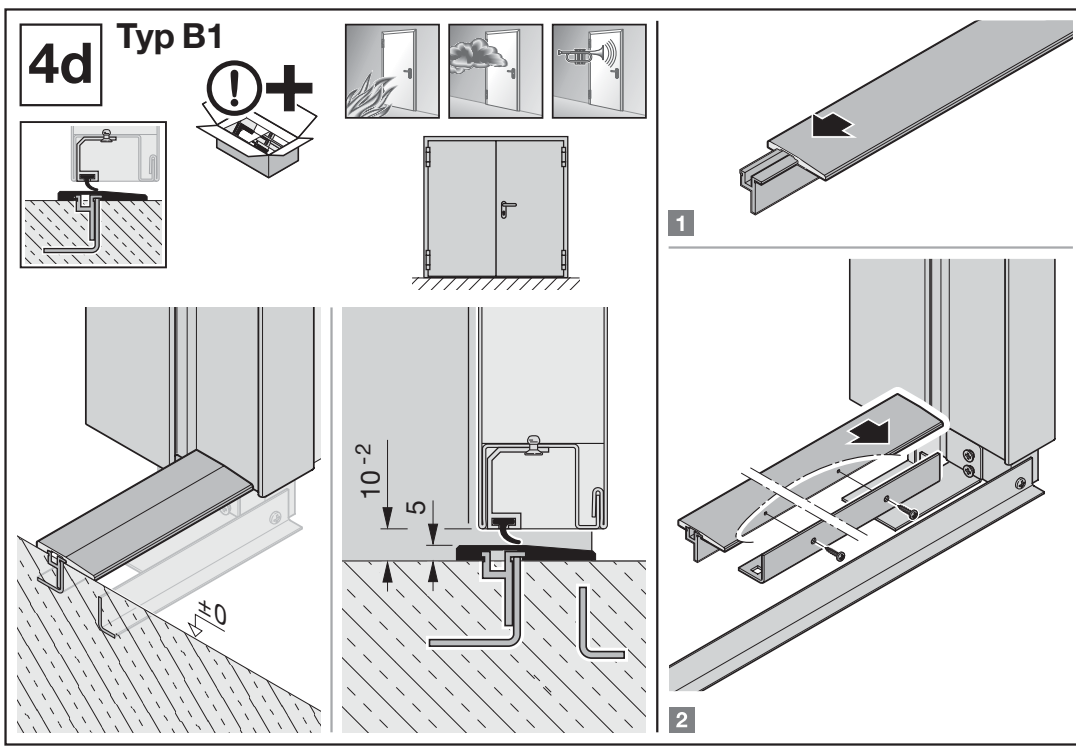


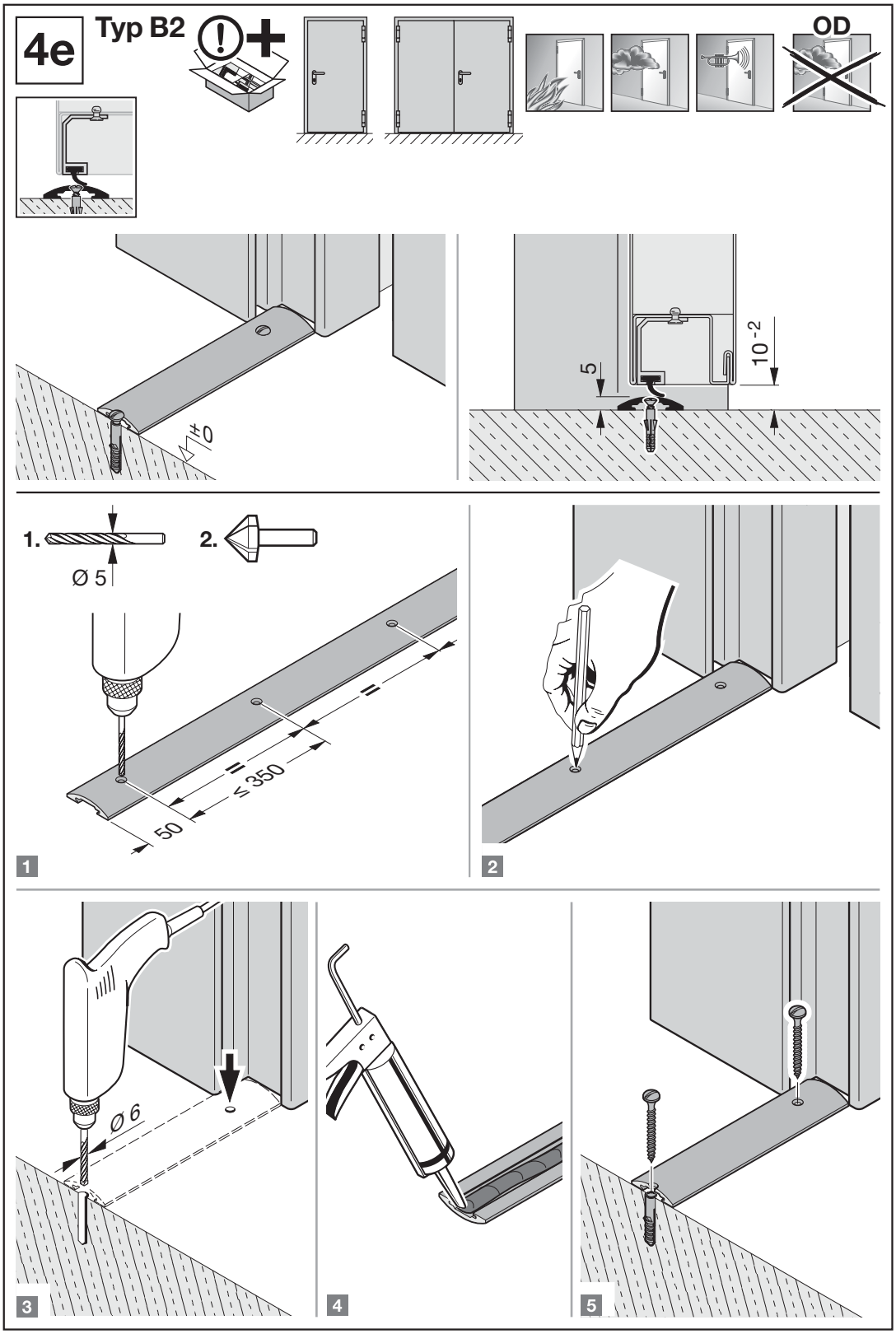


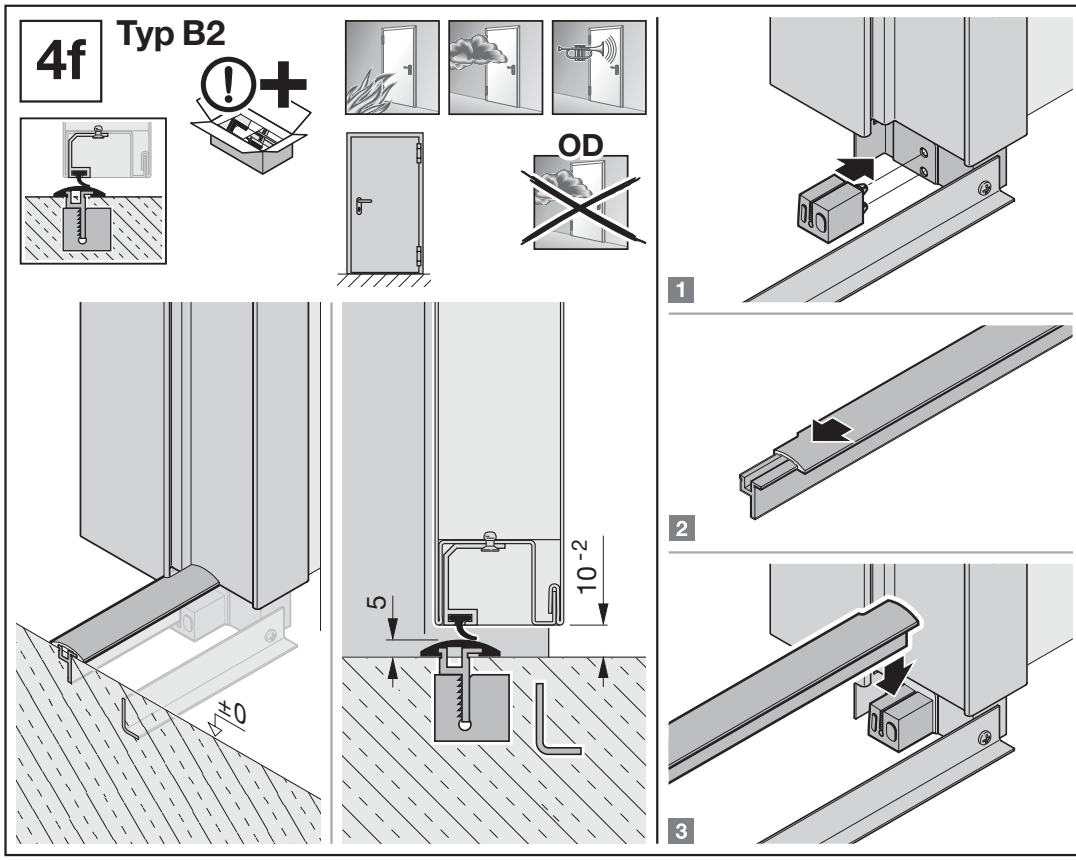

4a
Typ A1 - A4
A
B
10±5
10+2 -5
10-5
3
1
3
2
1
1
2
1
3 A
B

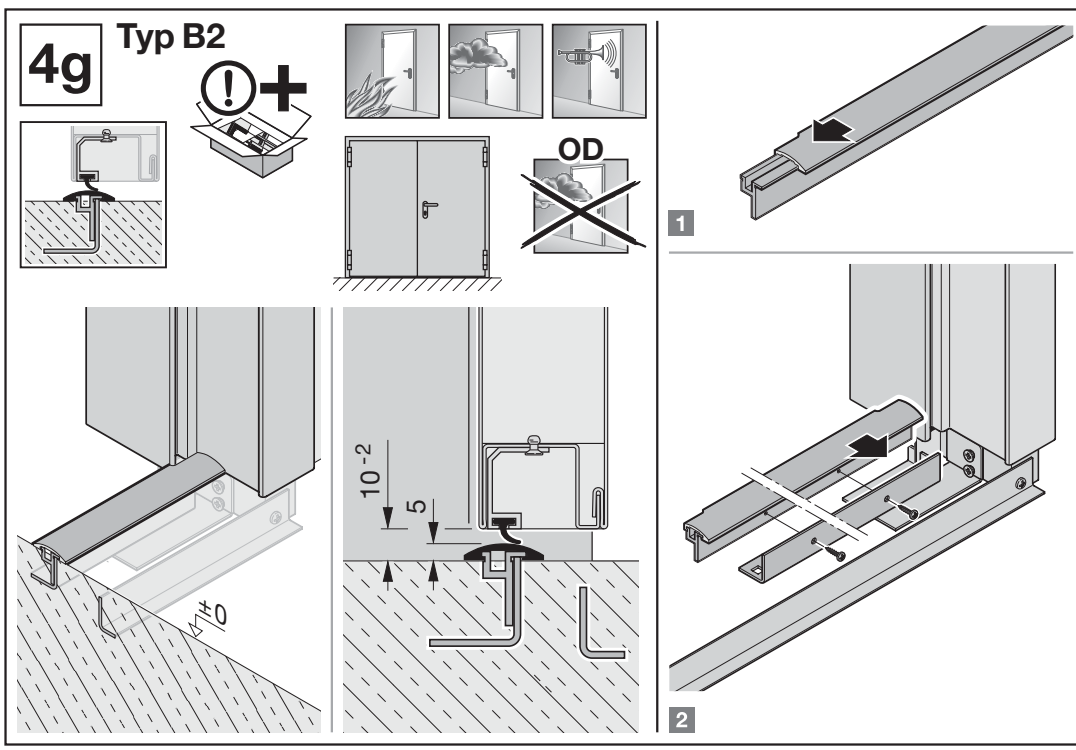

4b
Typ B1
10 - 2
5
20
1.
2.
Ø 5
≤ 350
20
50
1
2
Ø 6
3
4
5

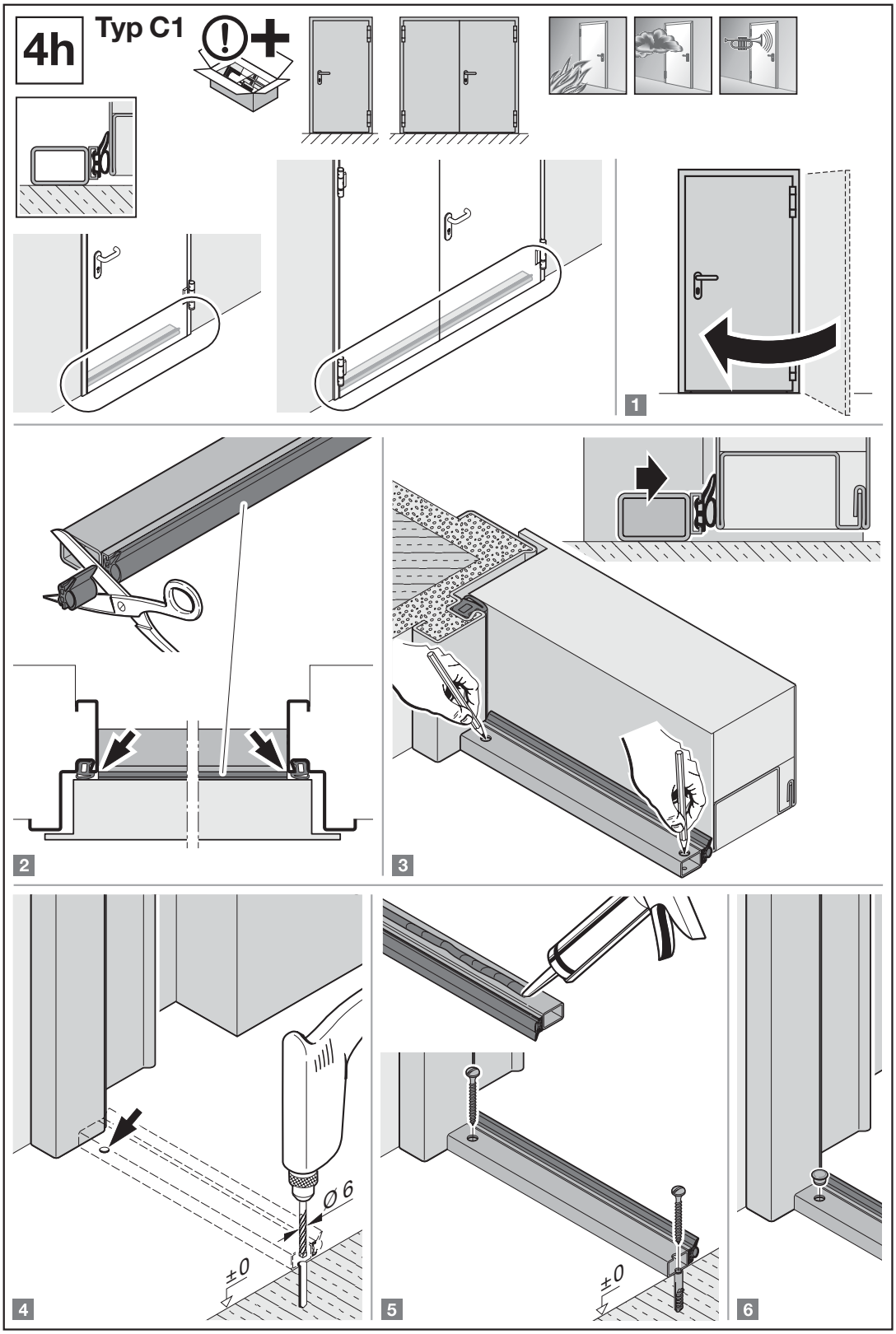

4c
Typ B1
5
10 -2
1
2
3

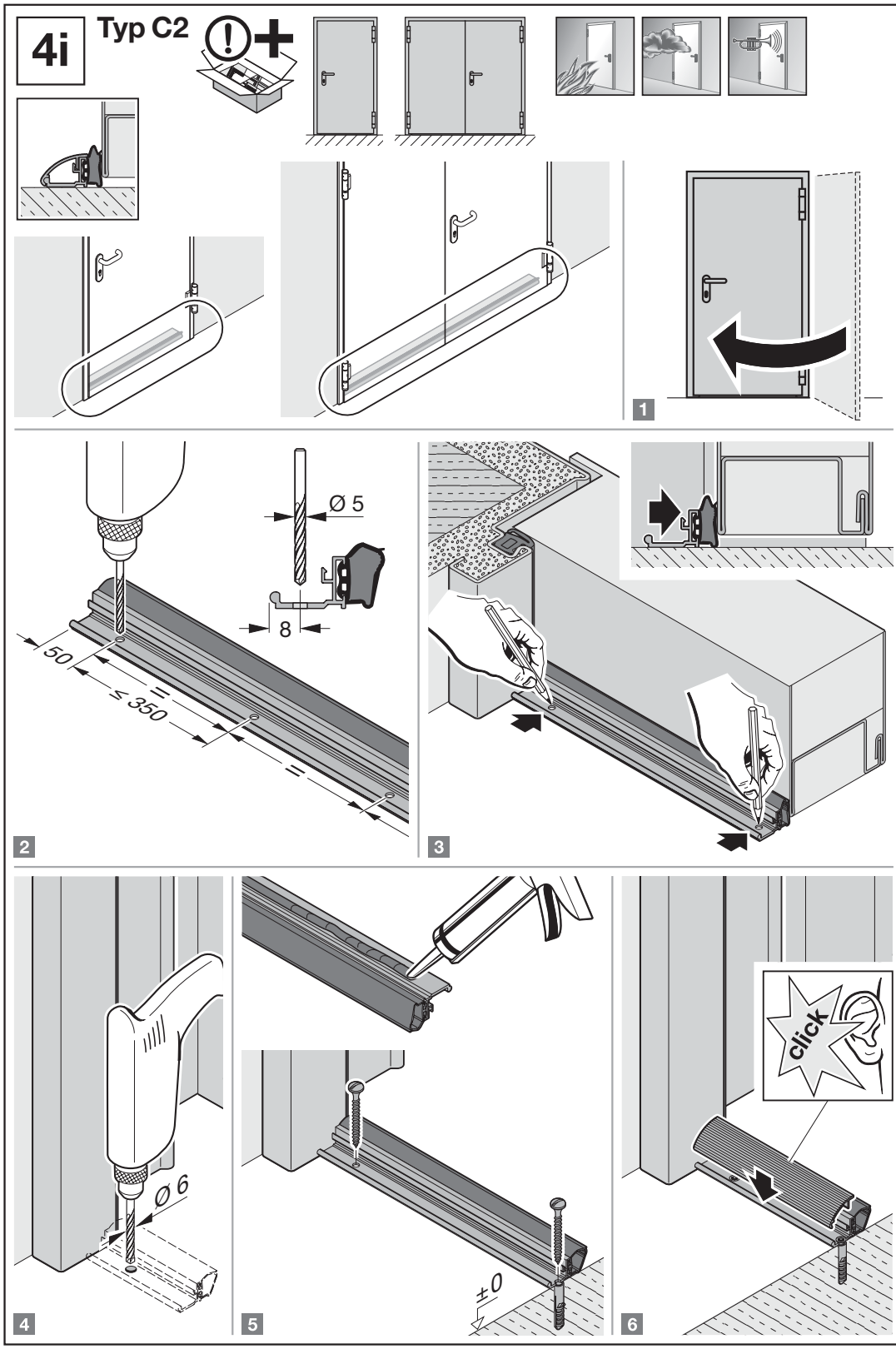

4d
Typ B1
10 -2
5
1
2

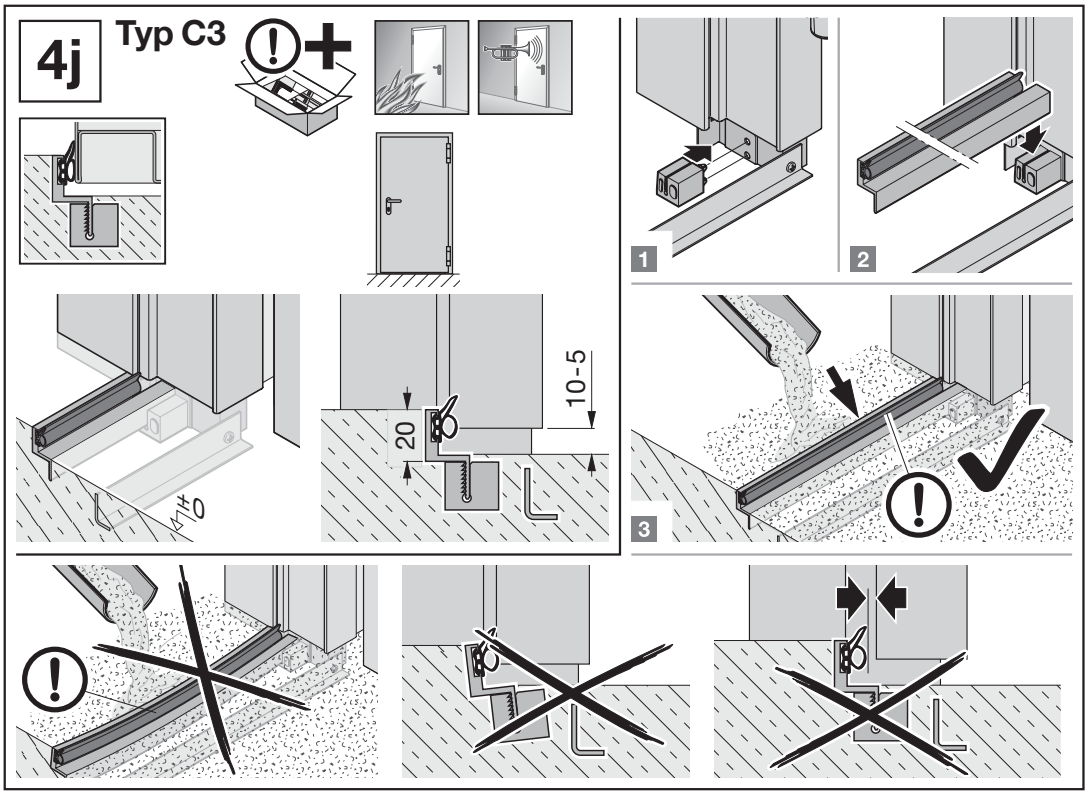

4e
Typ B2
OD
10 -2
5
1.
2.
Ø 5
≤ 350
50
Ø 6
1
2
3
4
5

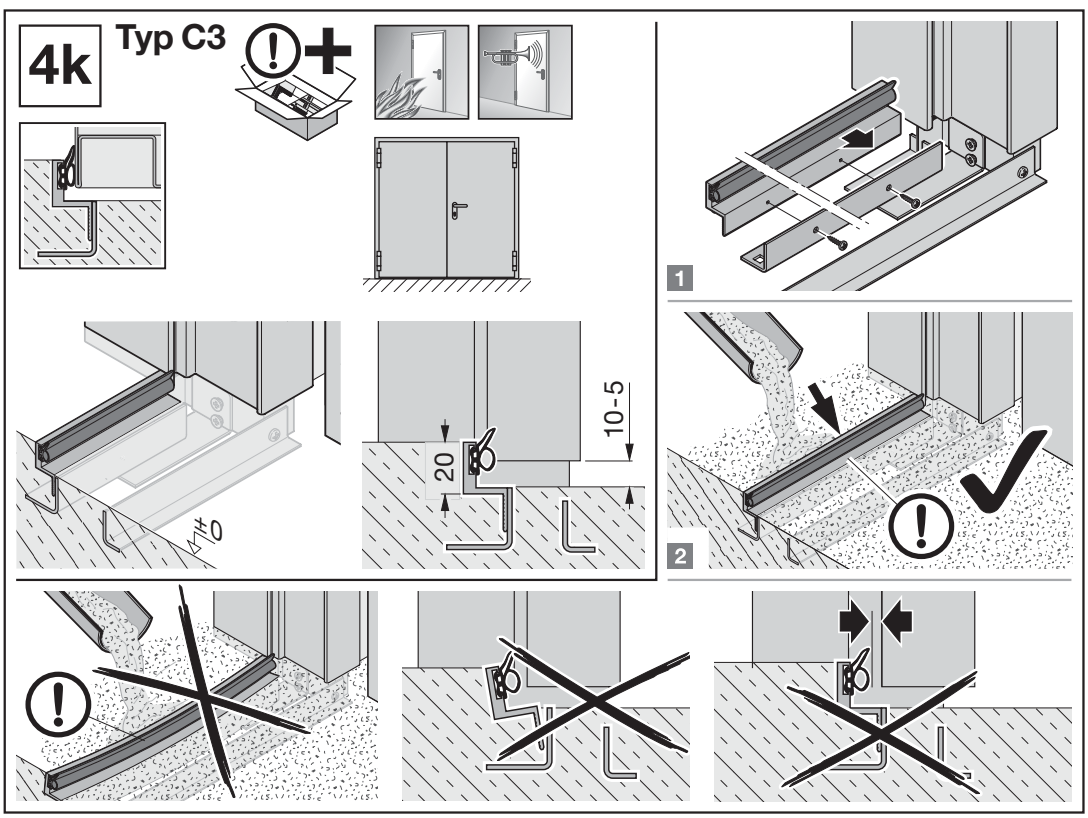

4f
Typ B2
OD
5
10 -2
0
1
2
3

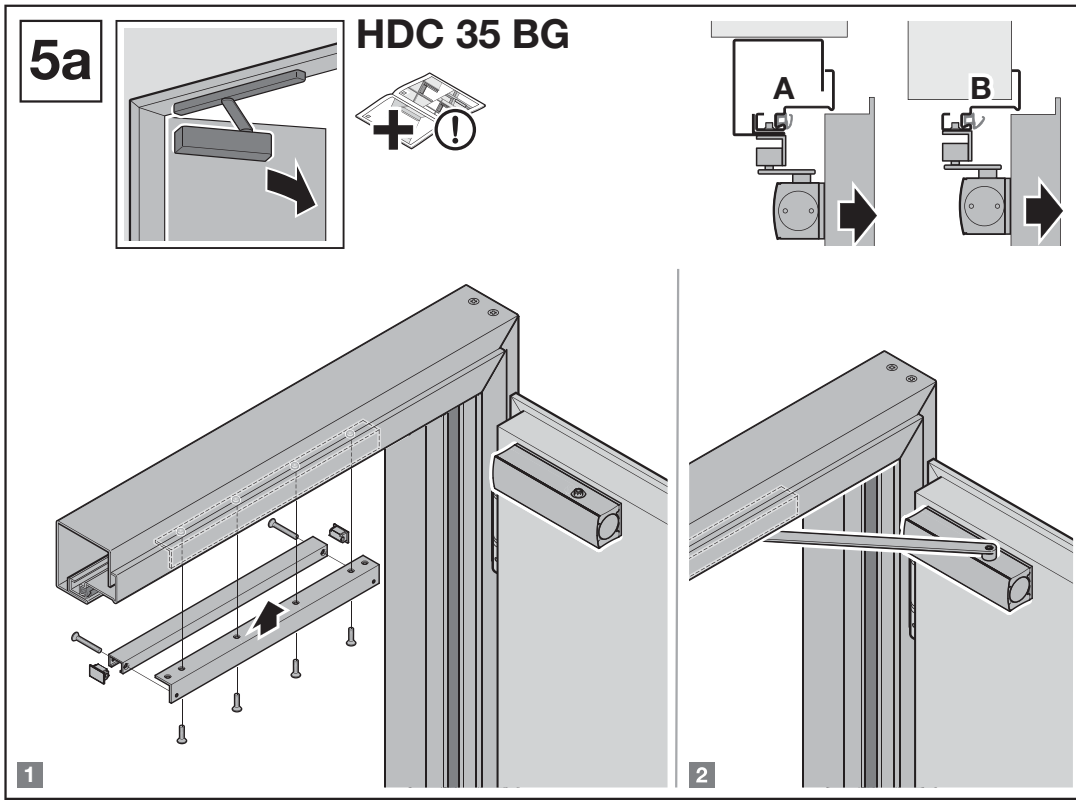

4g
Typ B2
OD
10 -2
5
0
1
2

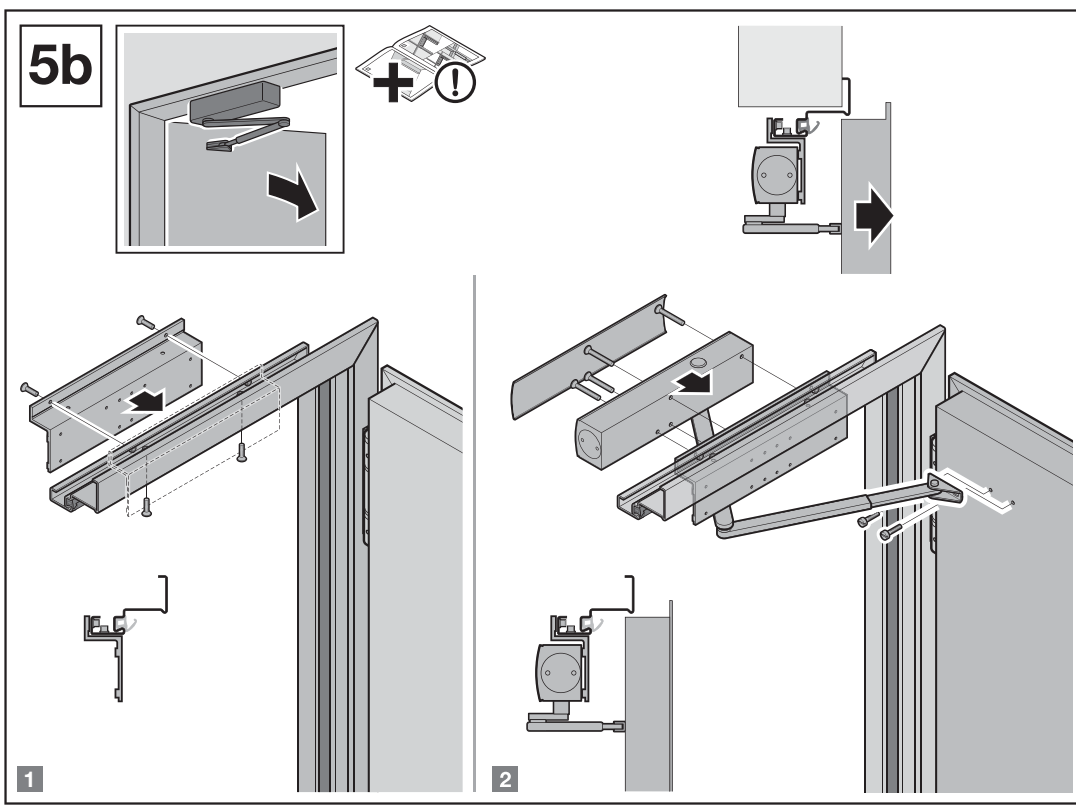

4h
Typ C1
1
2
3
Ø 6
±0
4
±0
5
6

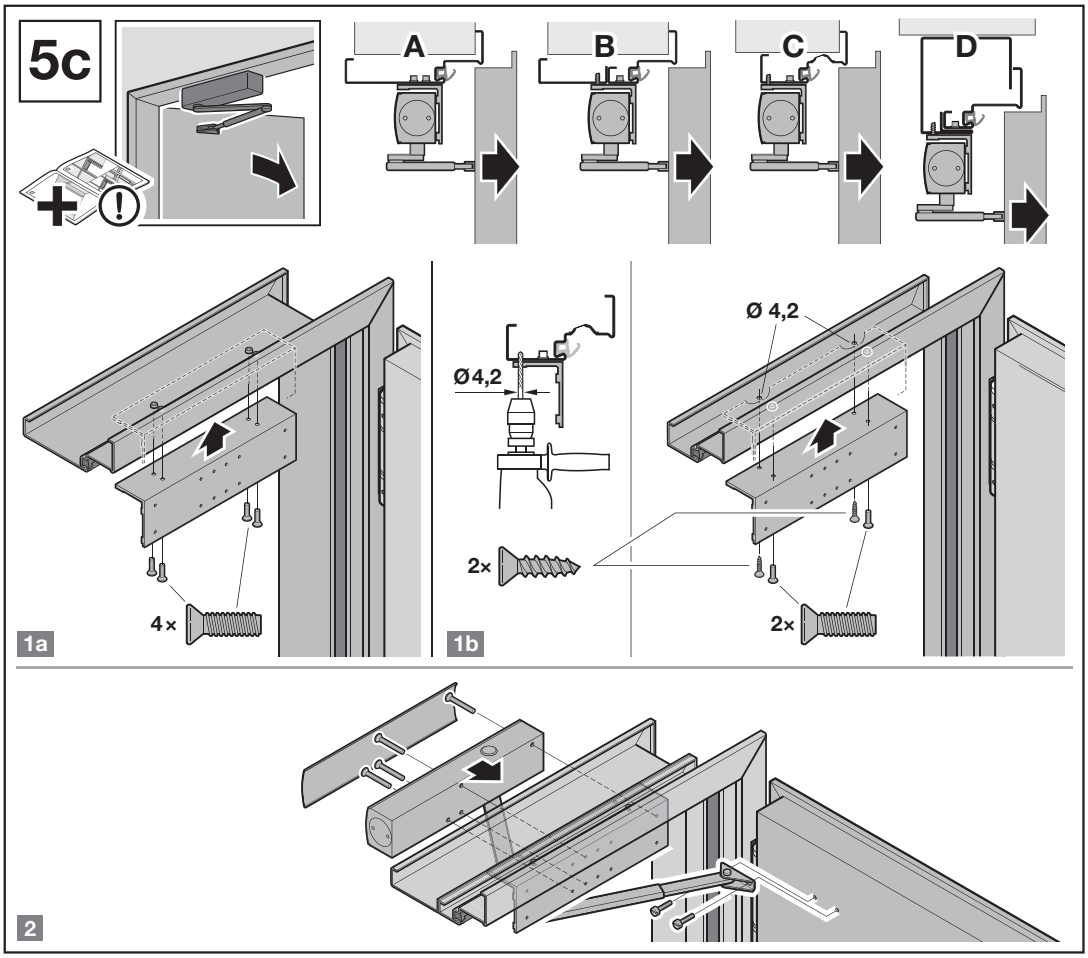

4i
Typ C2
Ø 5
8
50
≤ 350
1
2
3
Ø 6
±0
click
4
5
6

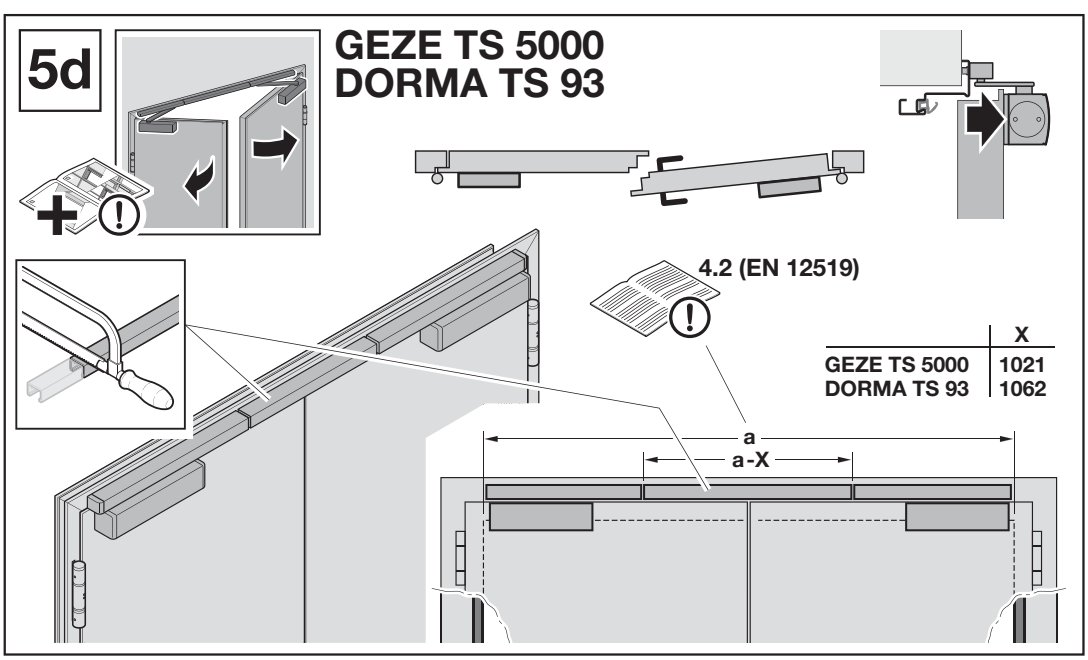

4j
Typ C3
10-5
20
1
2
3

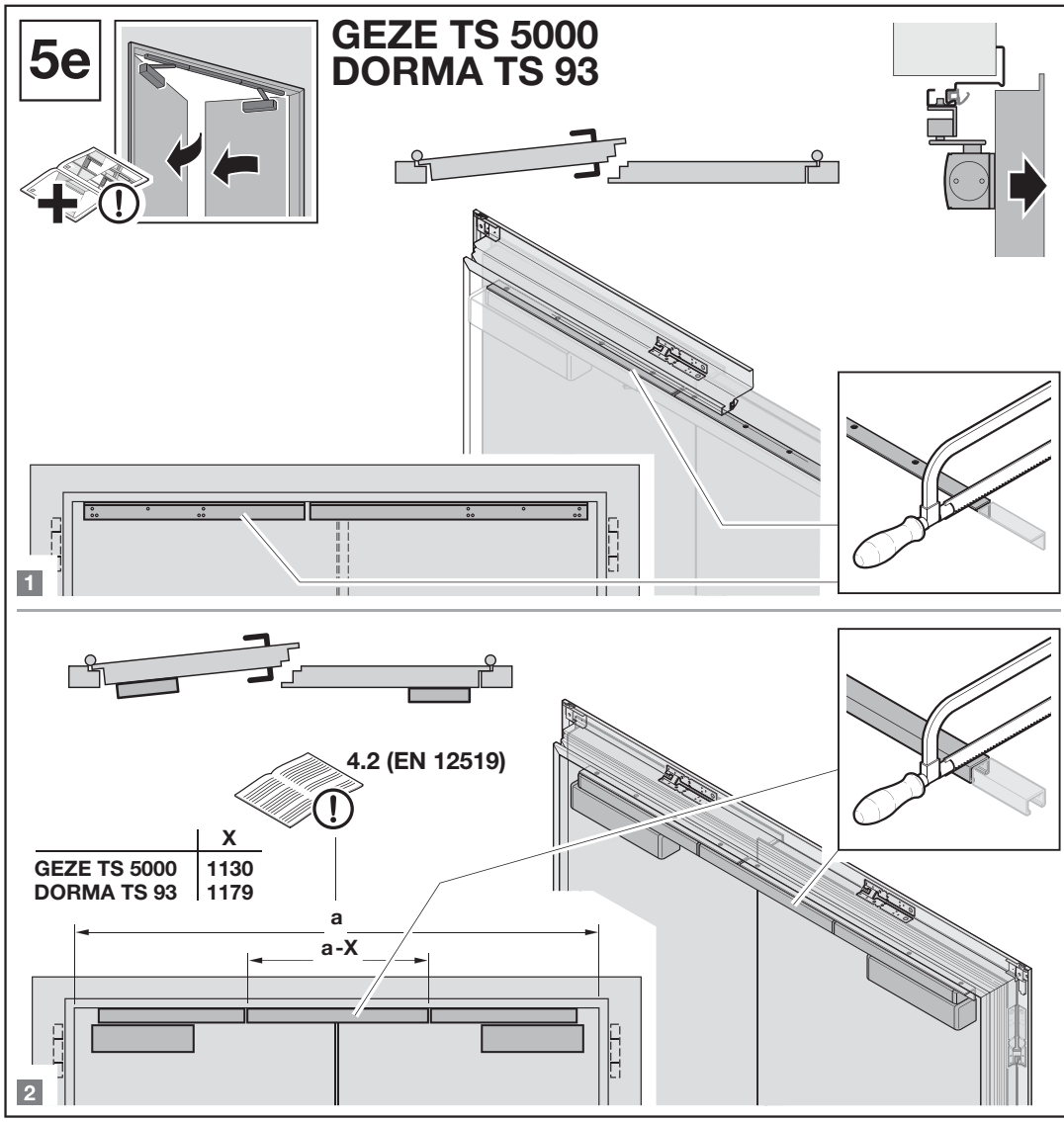

4k
Typ C3
10-5
20
1
2

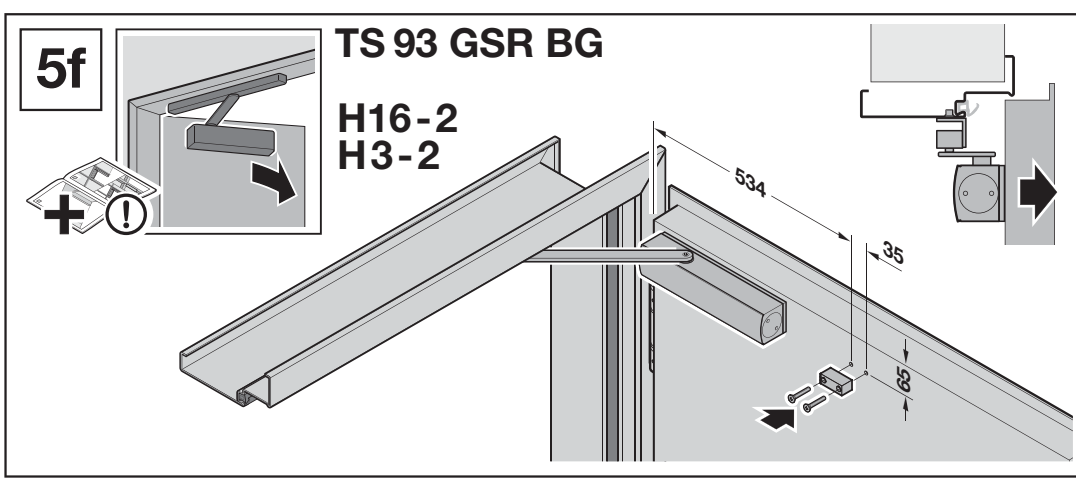

5a
HDC 35 BG
A
B
1
2

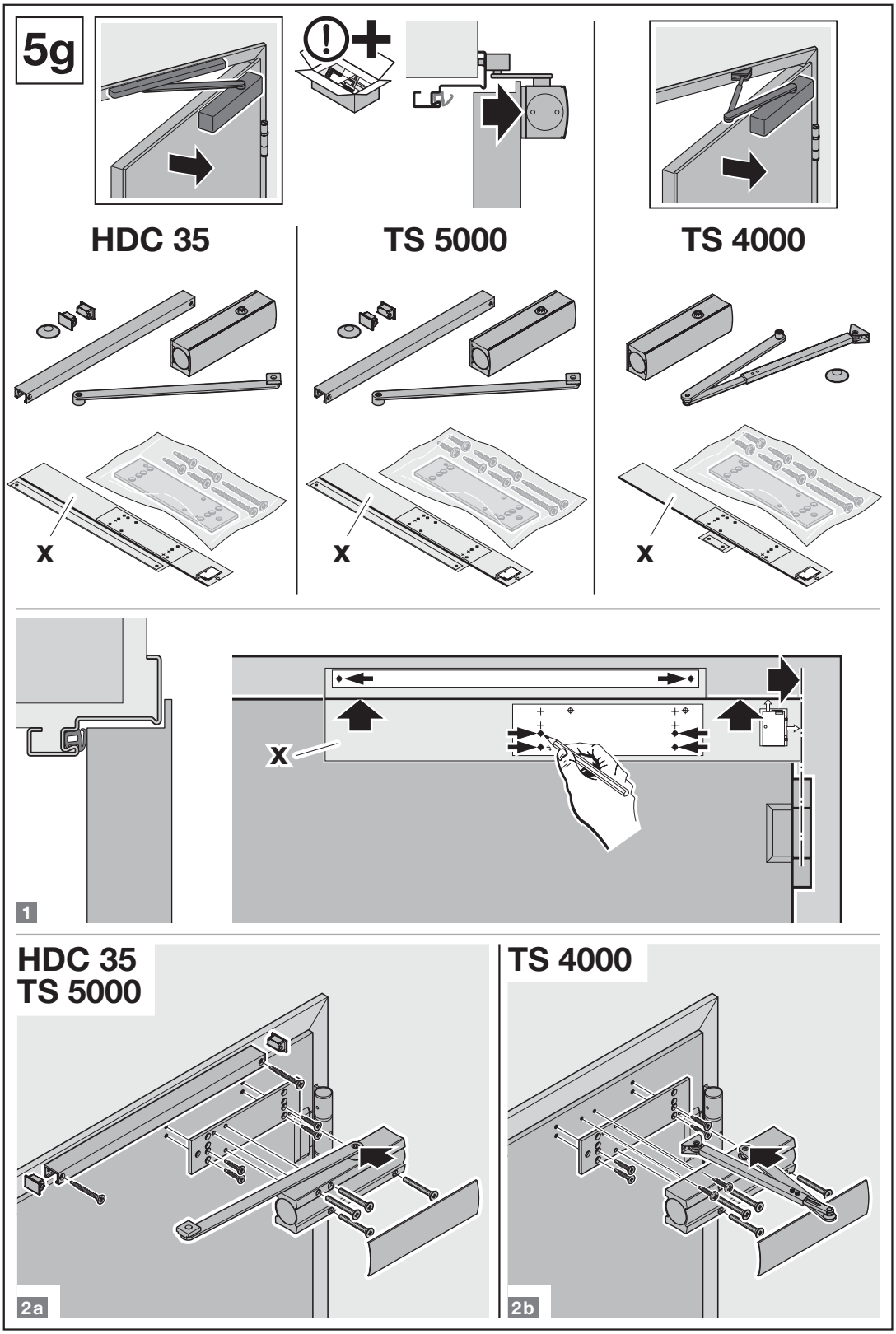

5b
1
2

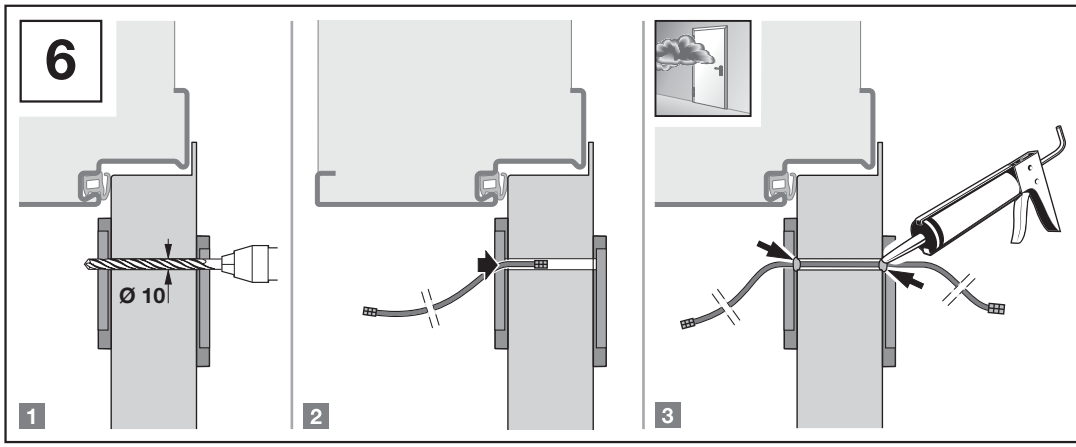

5c
A
B
C
D
Ø4,2
Ø 4,2
2×
4×
2×
1a
1b
2

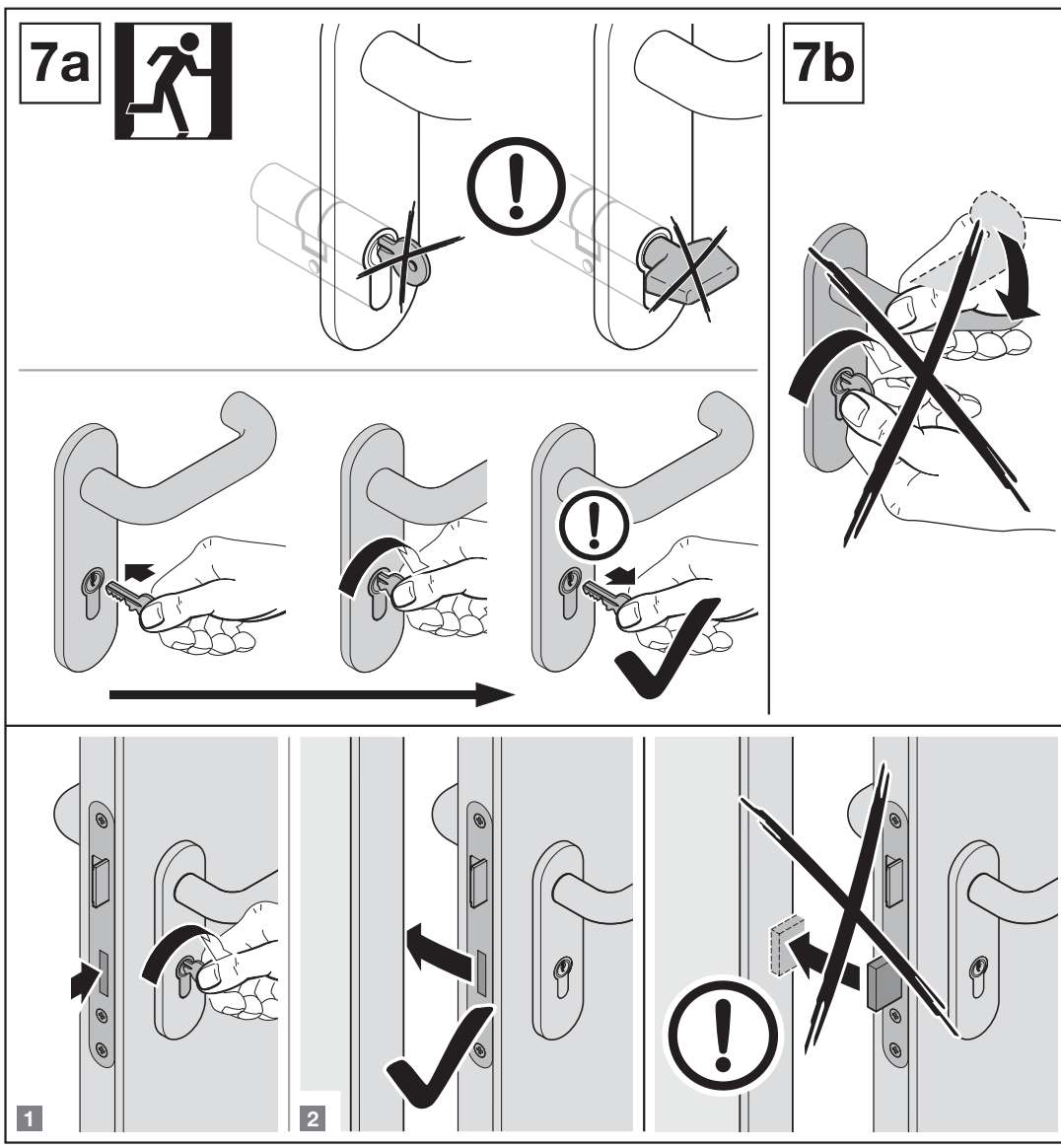

5d
GEZE TS 5000
DORMA TS 93
4.2 (EN 12519)
X
GEZE TS 5000 1021
DORMA TS 93 1062
a
a-X

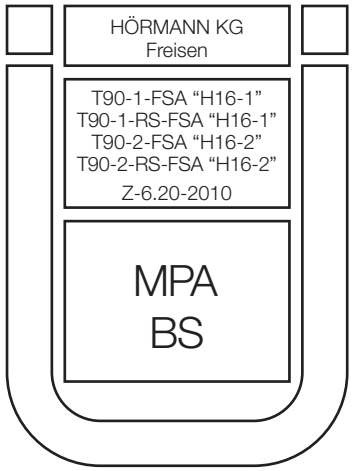

5e
GEZE TS 5000
DORMA TS 93
1
4.2 (EN 12519)
X
GEZE TS 5000 1130
DORMA TS 93 1179
a
a-X
2

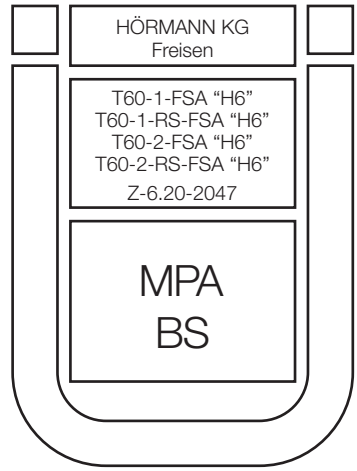

5f
TS 93 GSR BG
H16-2
H3-2
534
35
63

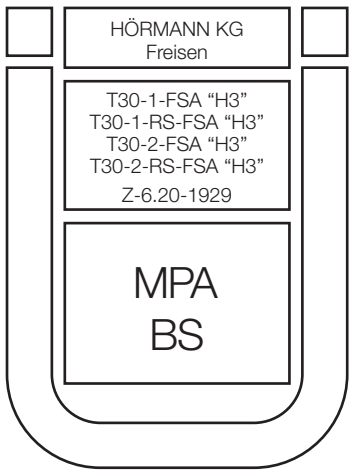

5g
HDC 35
TS 5000
TS 4000
X
X
X
X
1
HDC 35
TS 5000
2a
TS 4000
2b

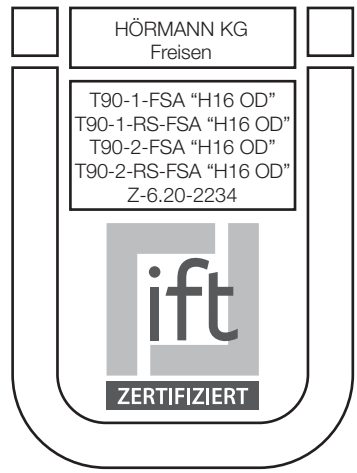

6
Ø 10
1
2
3

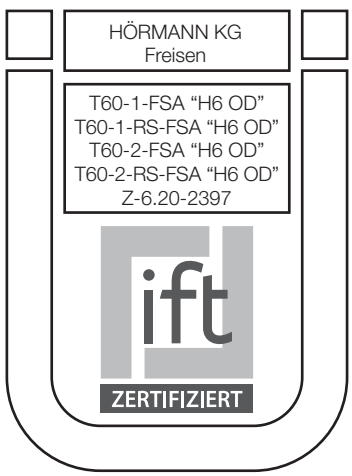

7a
7b
1
2

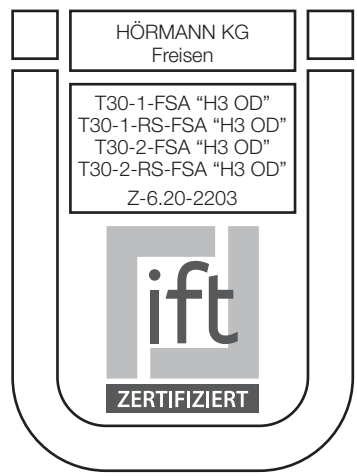












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