



DOCOCO technical training



Version 3-2012_rev1

For your Residential and Industrial door solutions: www.doco-international.com

Introduction:

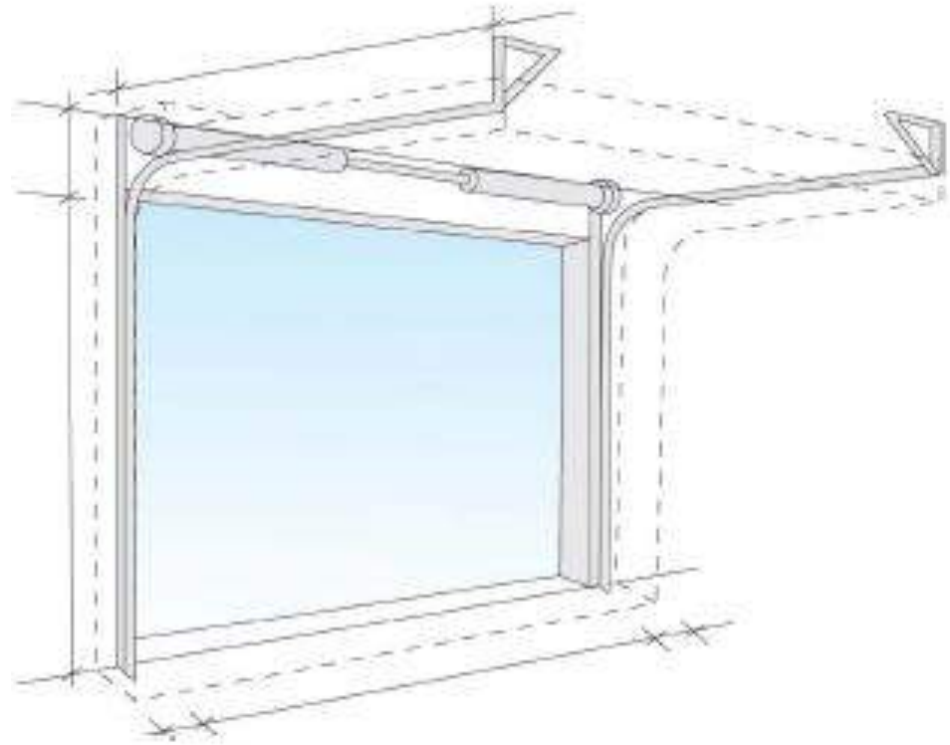
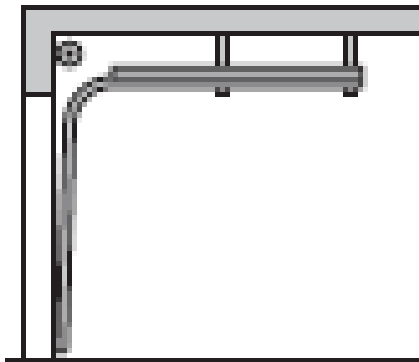
- Sectional door: invention USA
- Inventor : C.G. Johnson

Definition:

- **Sectional Overhead Door:** Vertical opened balanced door, with connected sections for closing buildings.

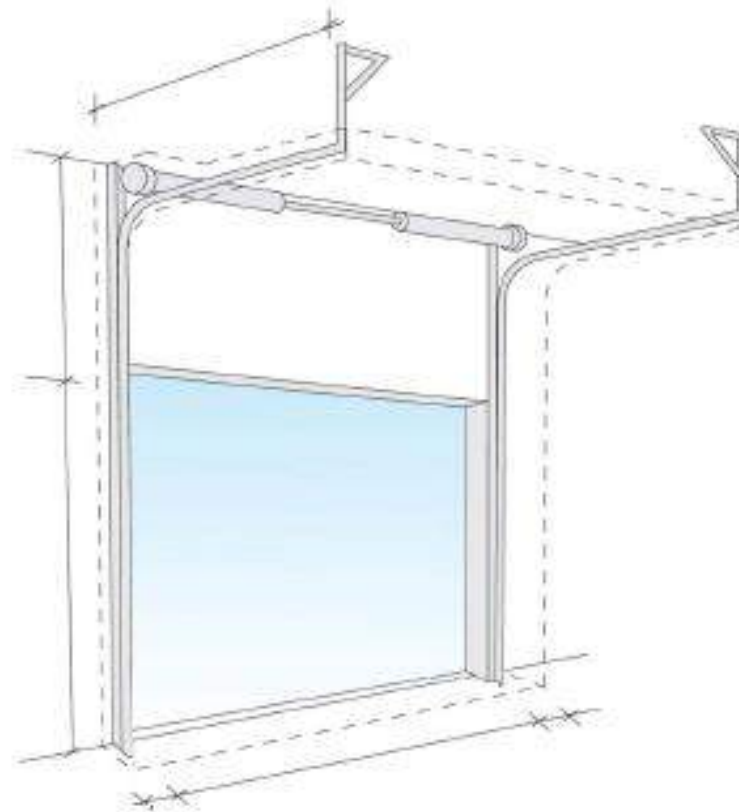
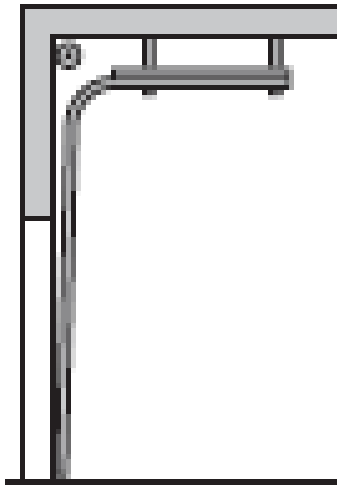
Industrial Sectional overhead doors types:

Standard Lift Doors



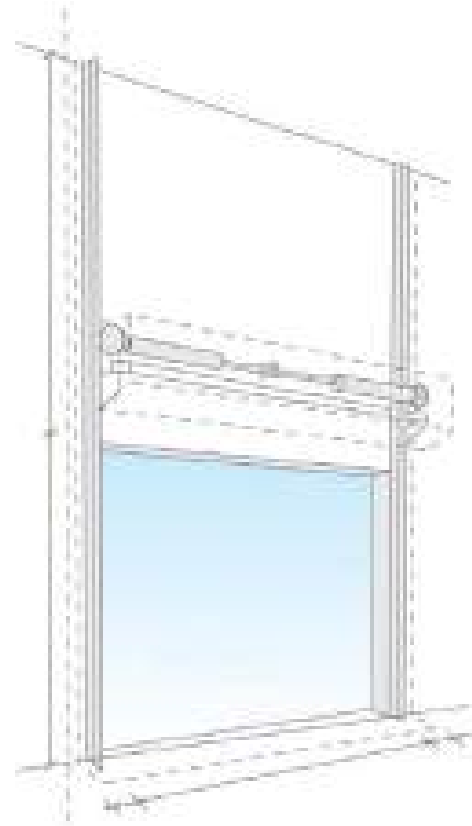
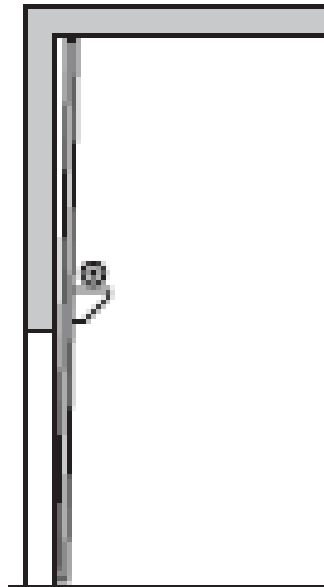
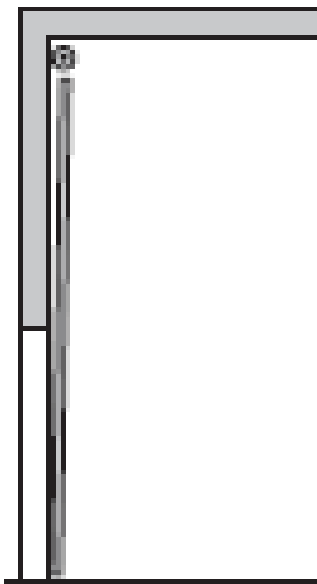
Industrial Sectional overhead doors types:

High Lift Doors



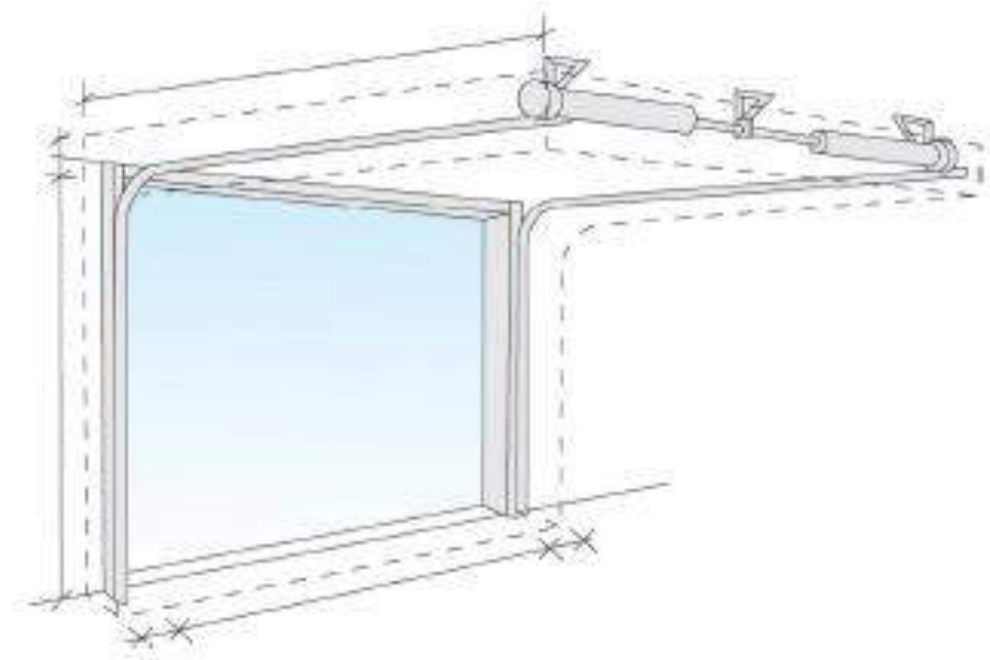
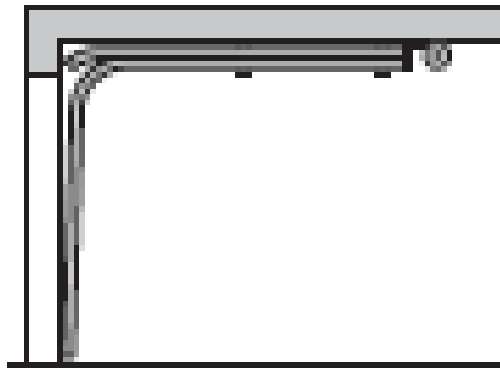
Industrial Sectional overhead doors types:

Full Vertical Doors



Industrial Sectional overhead doors types:

Low Headroom Doors



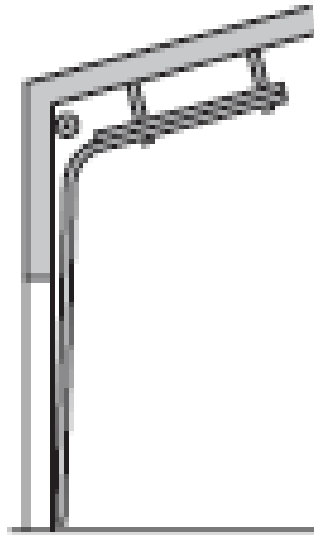
Industrial Sectional overhead doors types:

Standard Lift with Pitch



Industrial Sectional overhead doors types:

High Lift with Pitch



Sectional overhead doors types:

Residential (garage doors)

- Low Headroom Front.



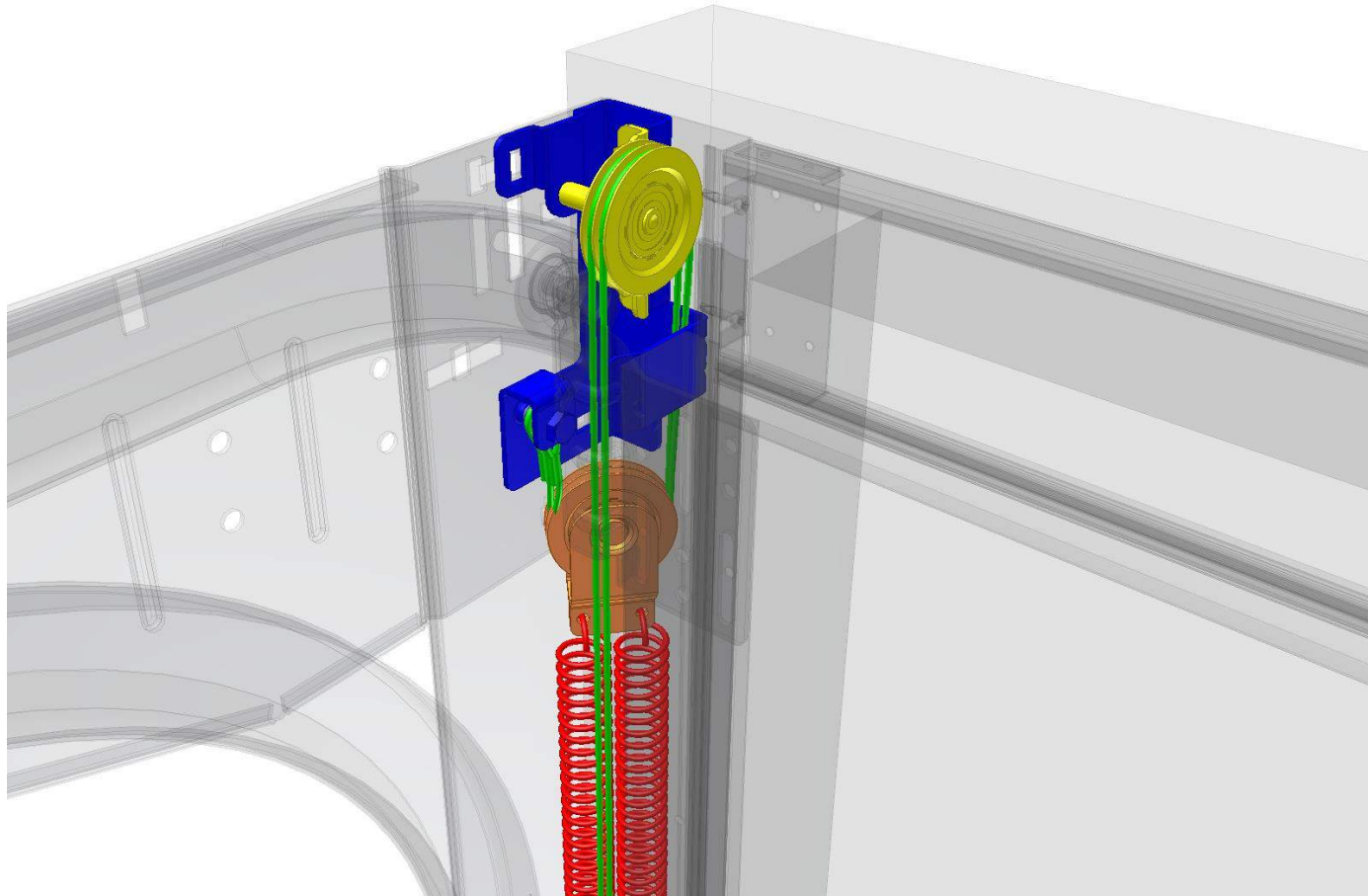
Sectional overhead doors types:

Residential (garage doors).

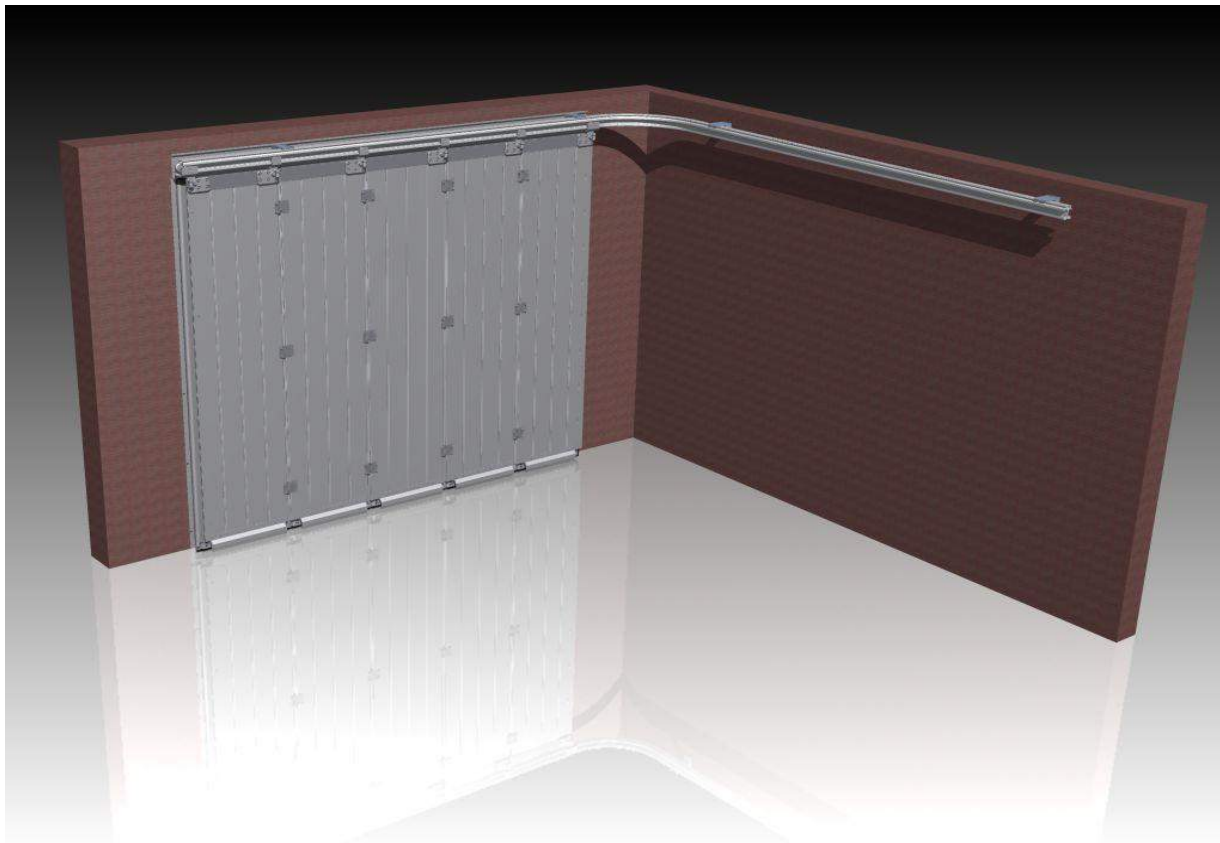
- Low Headroom Rear.



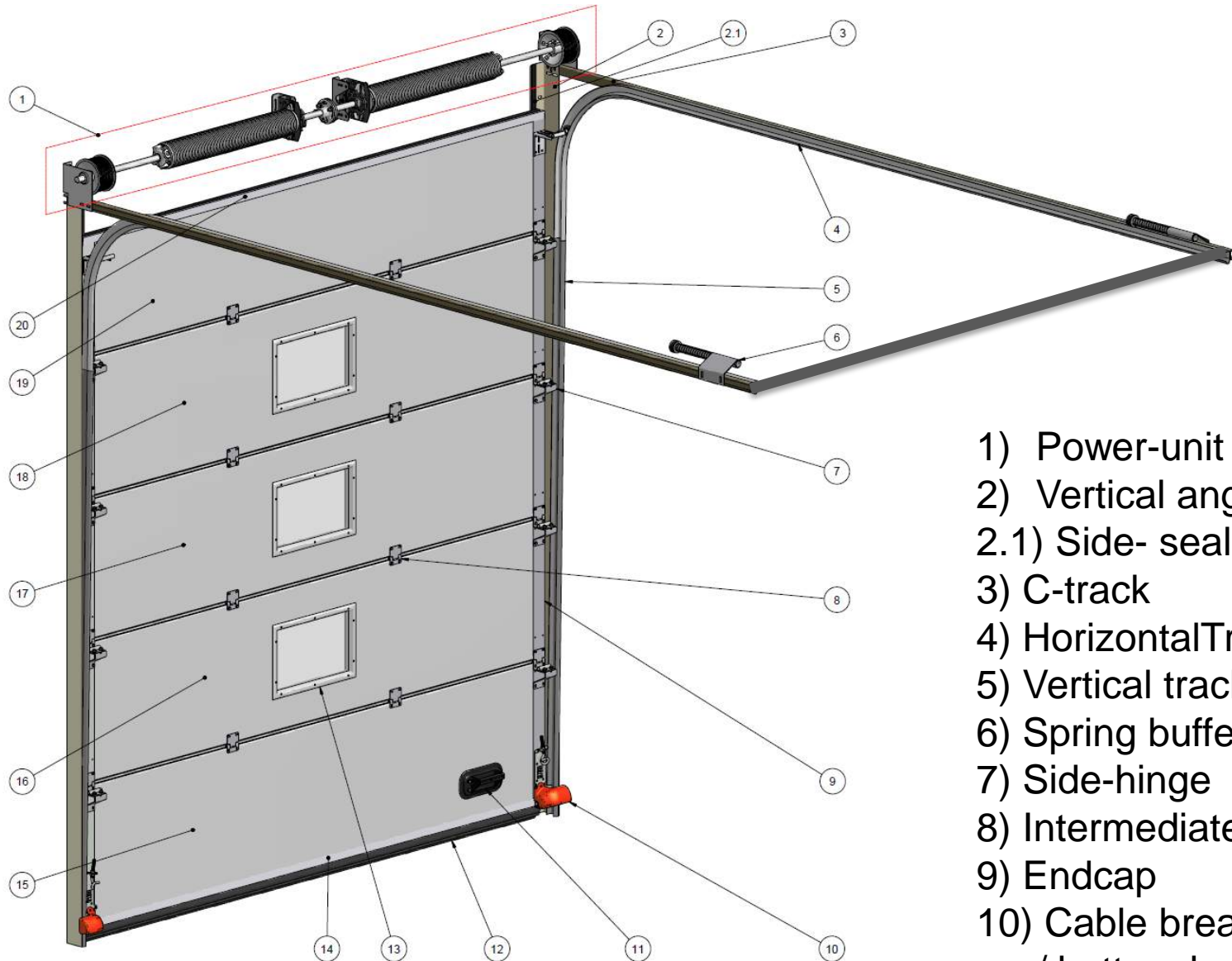
Sectional **EX**tension **S**pring Door (EXS): Residential (garage doors).



Sectional **S**ide **S**liding **D**oor (SSD): Residential (garage doors).

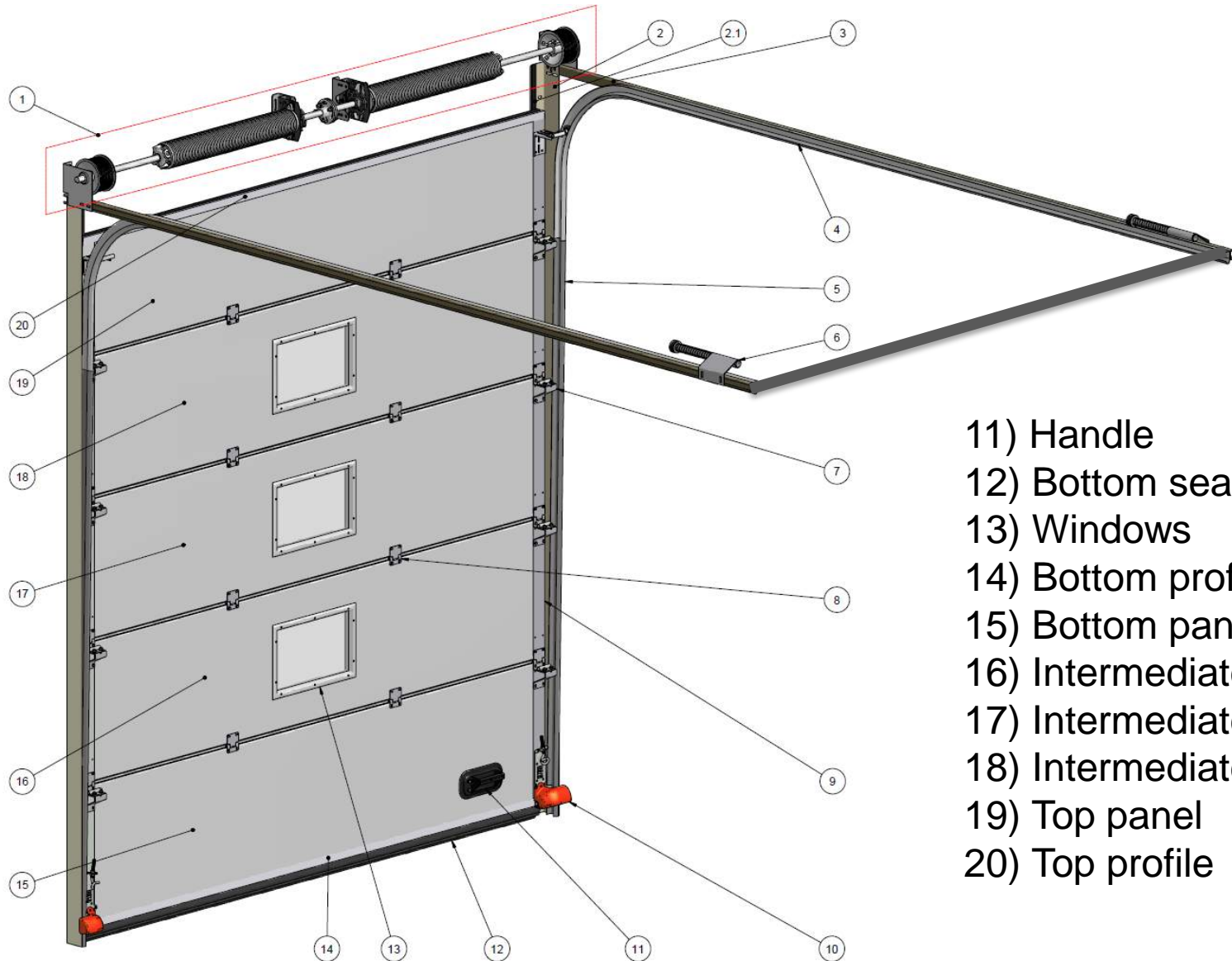


Main Parts:



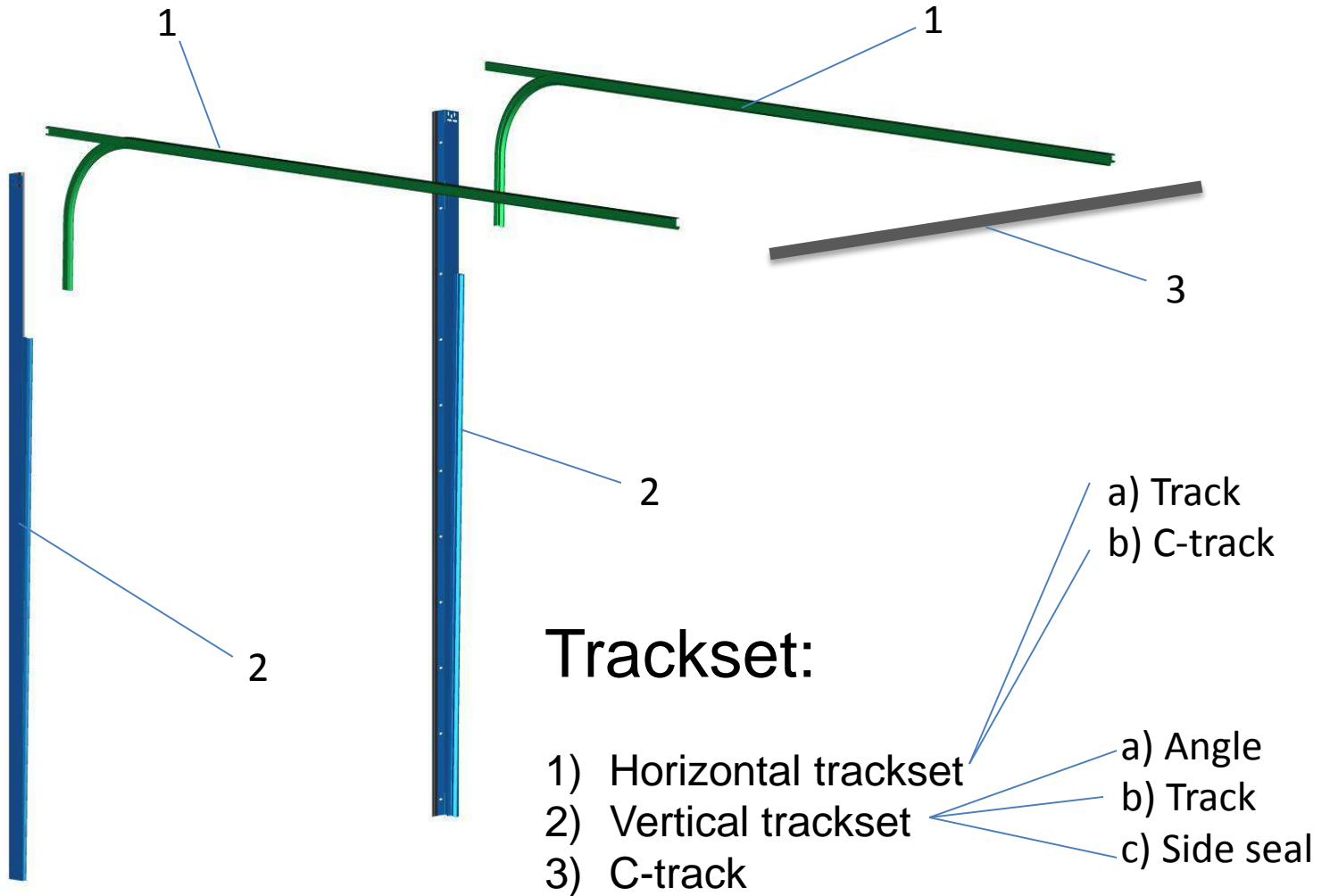
- 1) Power-unit
- 2) Vertical angle
- 2.1) Side- seal
- 3) C-track
- 4) HorizontalTrack
- 5) Vertical track
- 6) Spring buffer
- 7) Side-hinge
- 8) Intermediate hinge
- 9) Endcap
- 10) Cable break device / bottom bracket

Main Parts:

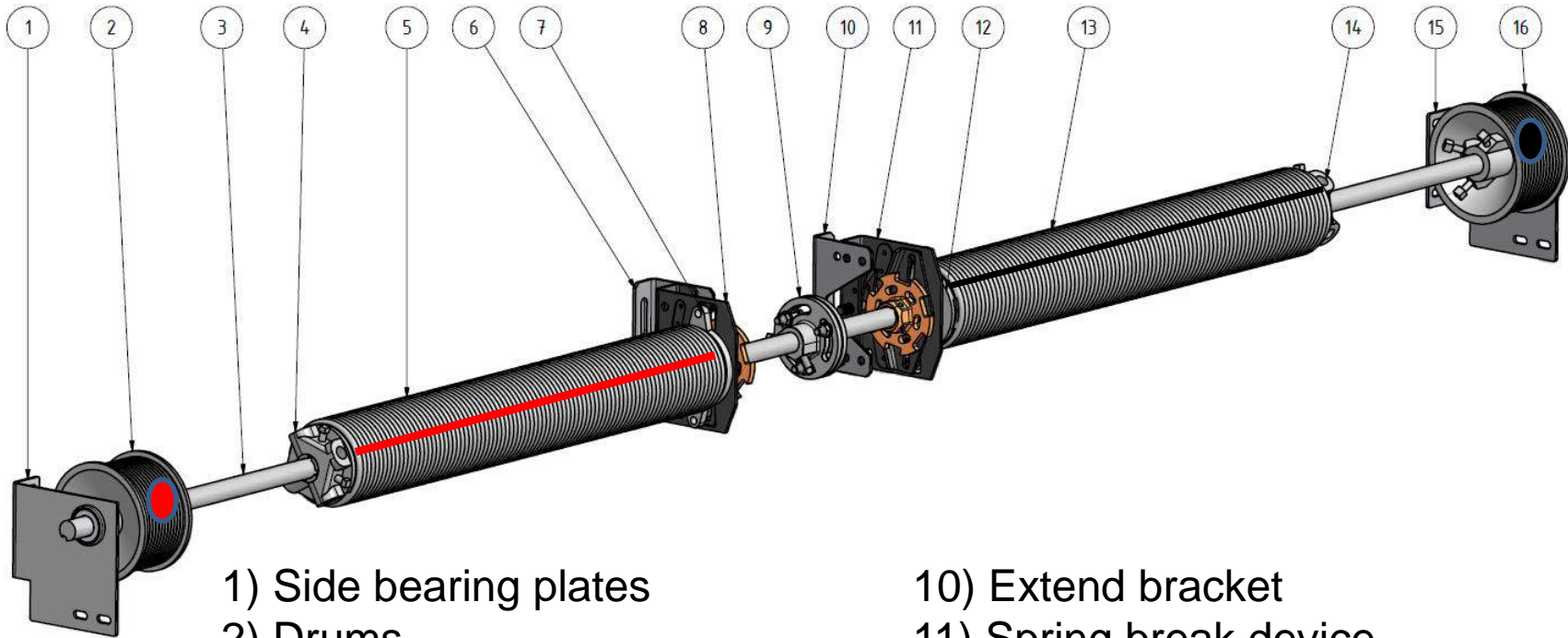


- 11) Handle
- 12) Bottom seal
- 13) Windows
- 14) Bottom profile
- 15) Bottom panel
- 16) Intermediate panel
- 17) Intermediate panel
- 18) Intermediate panel
- 19) Top panel
- 20) Top profile

Main Parts:



Main Parts:

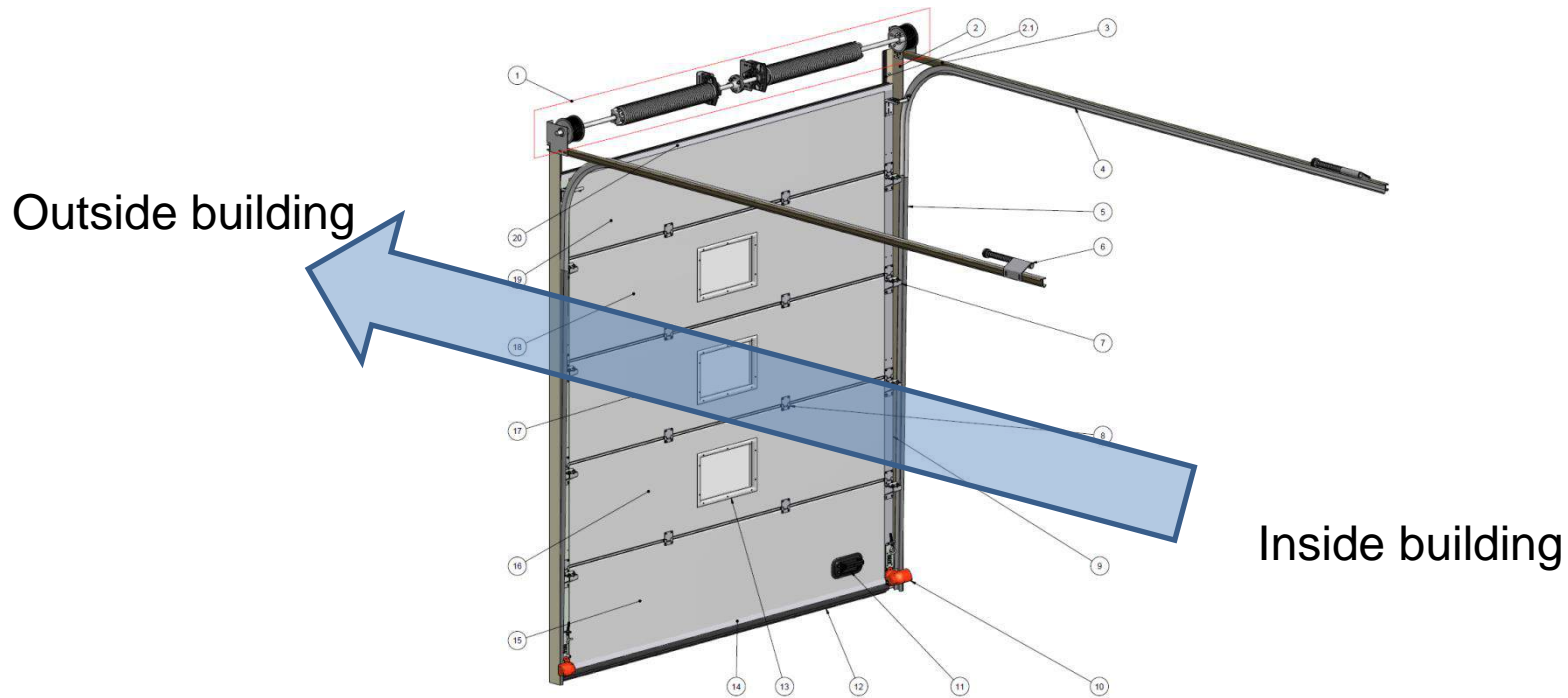


- 1) Side bearing plates
- 2) Drums
- 3) Shaft
- 4) Spring plug winding
- 5) Torsion - Spring
- 6) Extend bracket
- 7) Spring plug stationary
- 8) Spring break device
- 9) Coupler

- 10) Extend bracket
- 11) Spring break device
- 12) Spring plug stationary
- 13) Spring
- 14) Spring plug winding
- 15) Side bracket
- 16) Drum

Inside / outside – Left /right

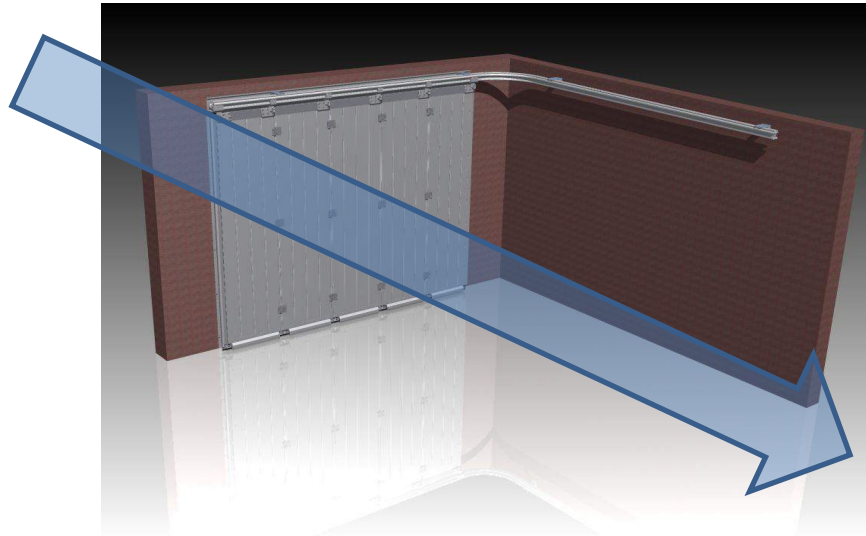
Always look from inside to outside to determine Left or Right
(for section overhead doors)!



Inside / outside – Left /right

Always look from outside to inside to determine Left or Right
(for side sectional doors SSD)!

Outside building



Inside building

Color Codes

What's color code?

- Drums
- Springs
- Some Spring Plugs

Drums:



Left drum (red)



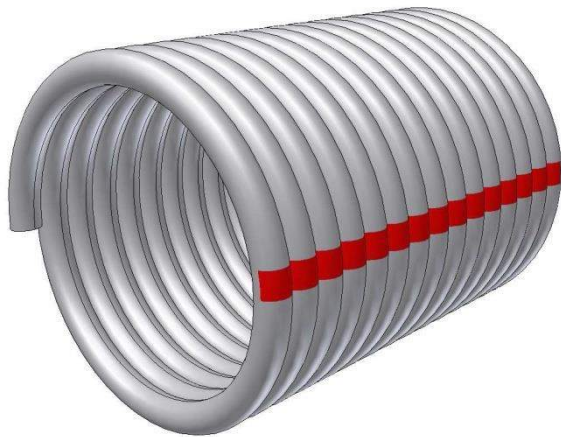
Right drum (black)

Color Codes

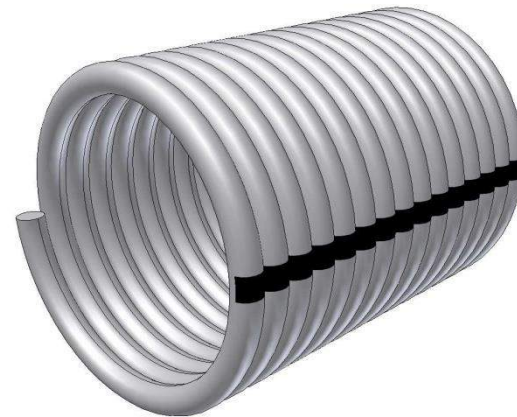
What's color code?

- Drums
- **Springs**
- Some Spring Plugs

Springs:



Right spring (red)



Left spring (black or blue)

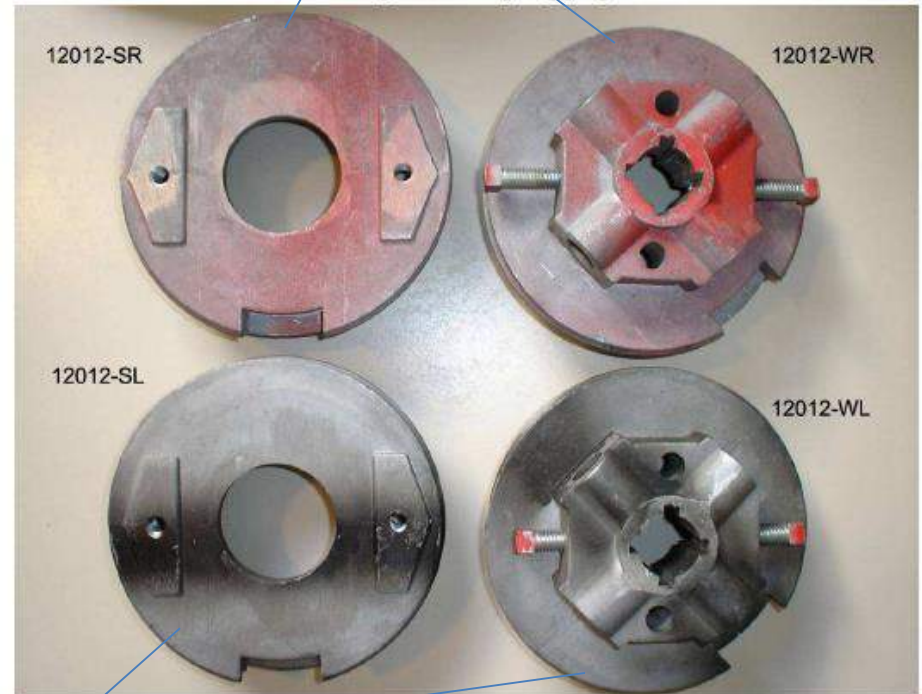
Color Codes

What's color code?

- Drums
- Springs
- **Spring Plugs 12012**

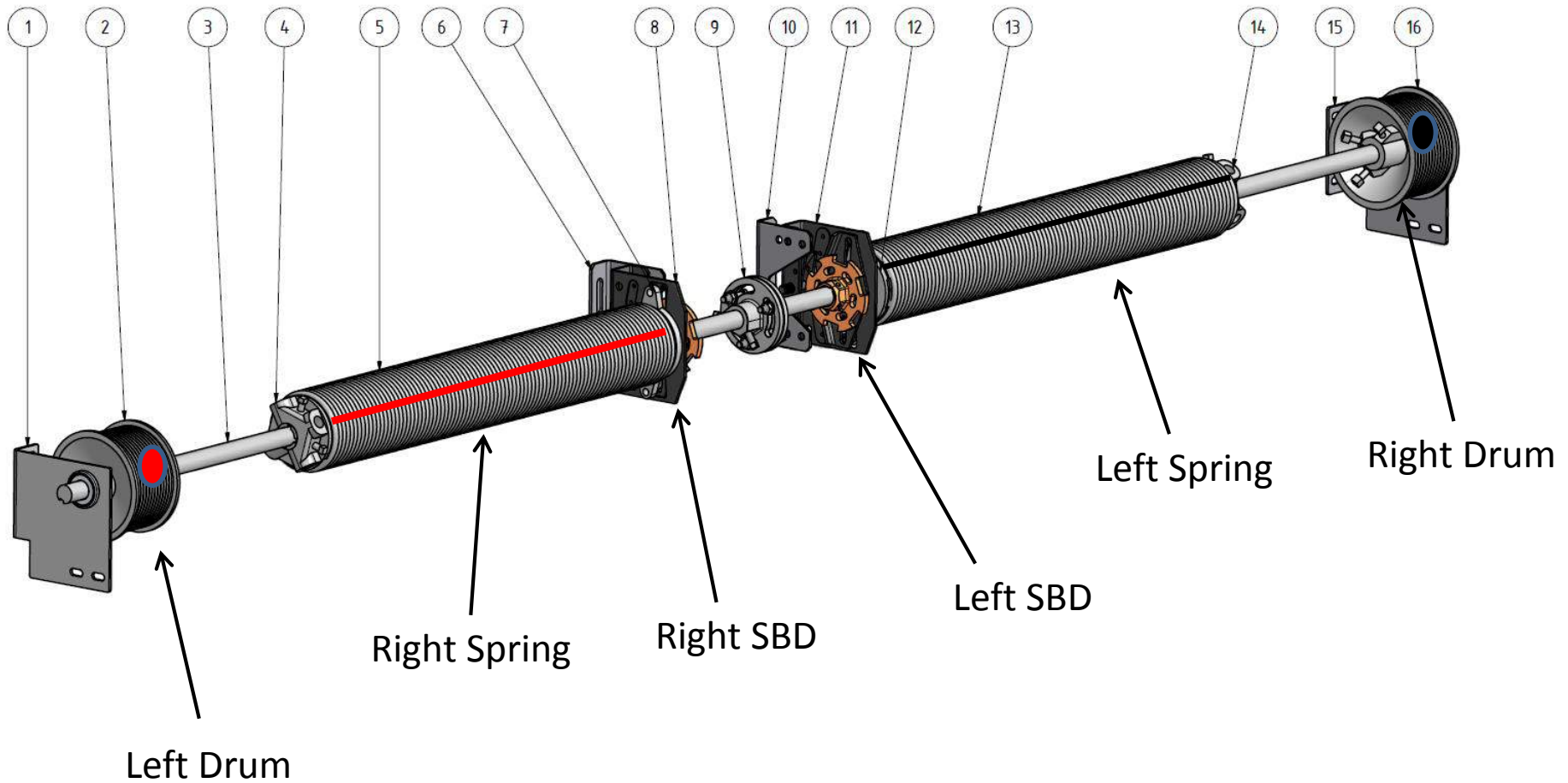
Springs plugs 12012:

Right spring plugs (red)



Left spring plugs (black)

Summary:



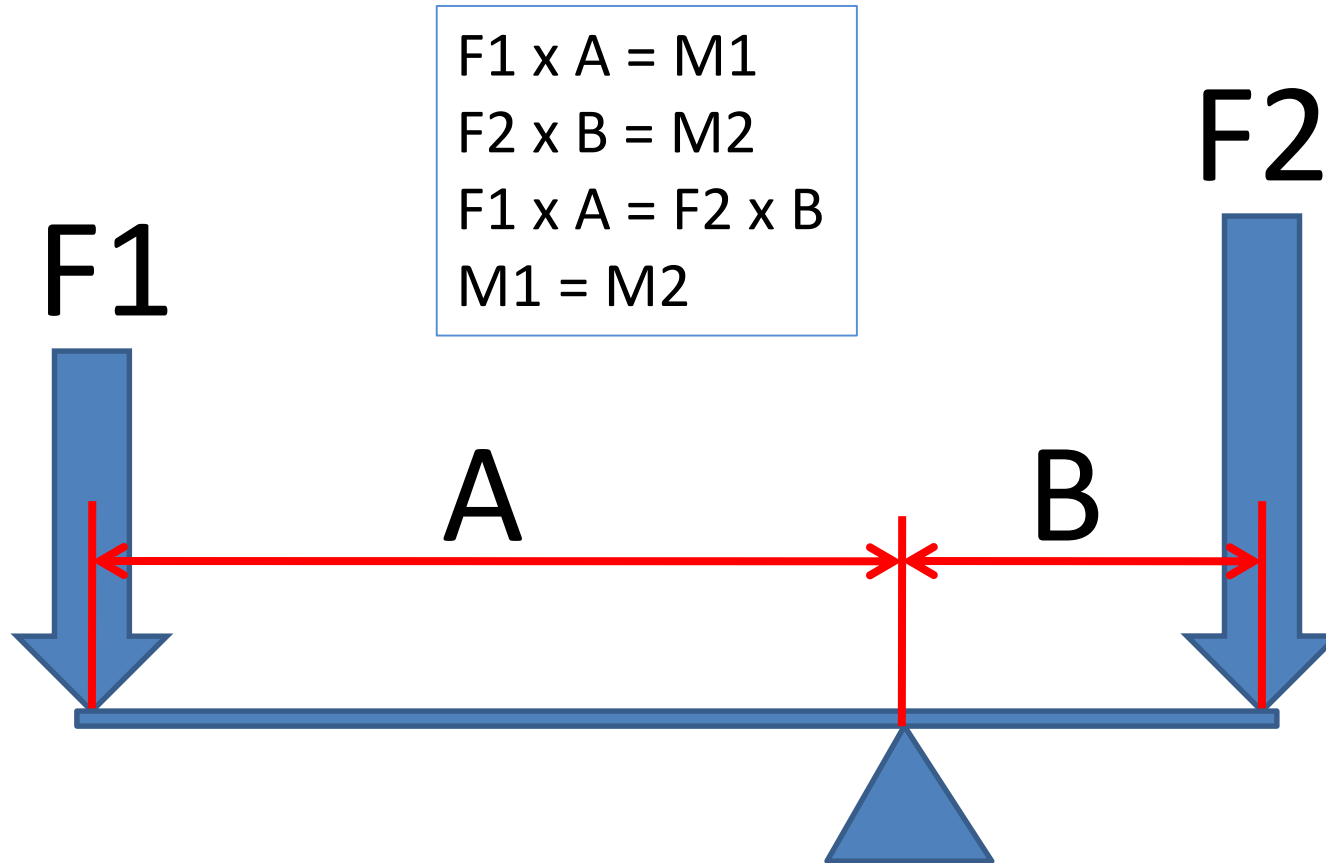
SBD = Spring Break Device

How does a sectional door work?

A Sectional door is balanced in every position!



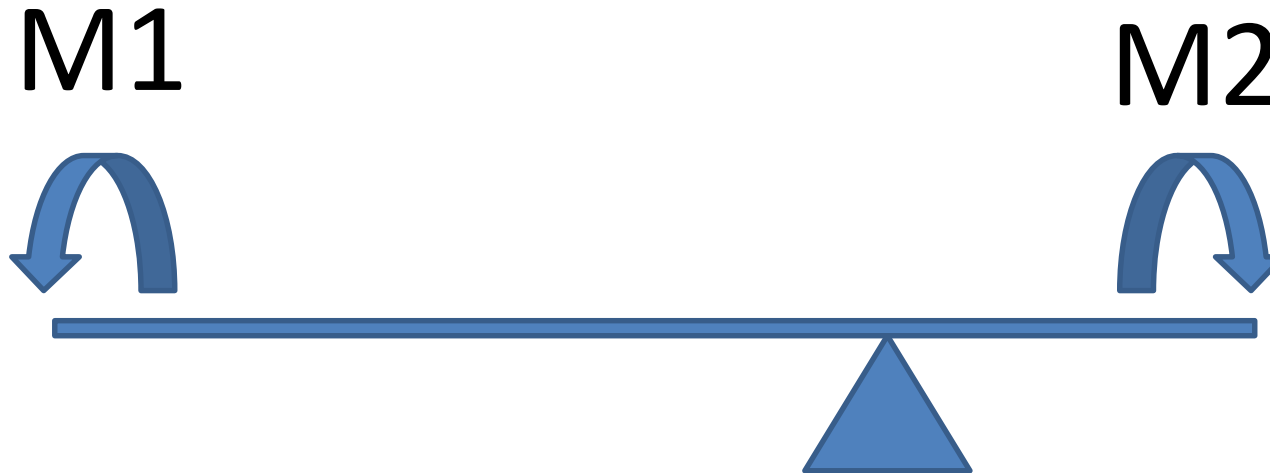
How does a sectional door work?



How does a sectional door work?

Moment 1= Moment 2

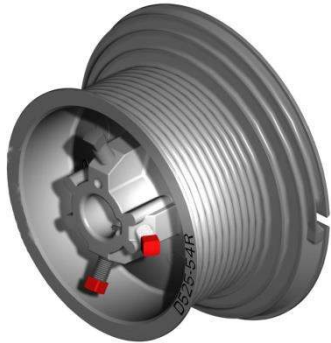
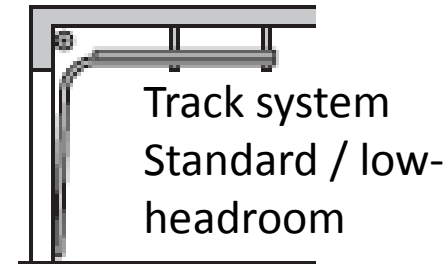
To have balance , the Spring Moment and Door Moment need to be equal!!



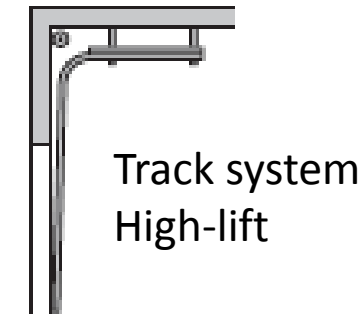
Drums



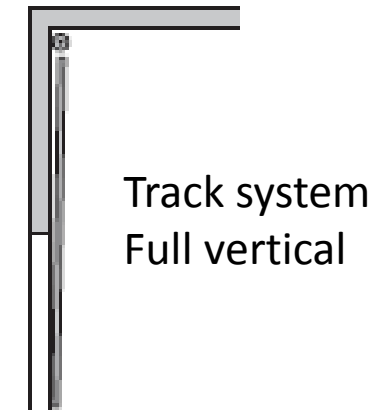
Standard drum



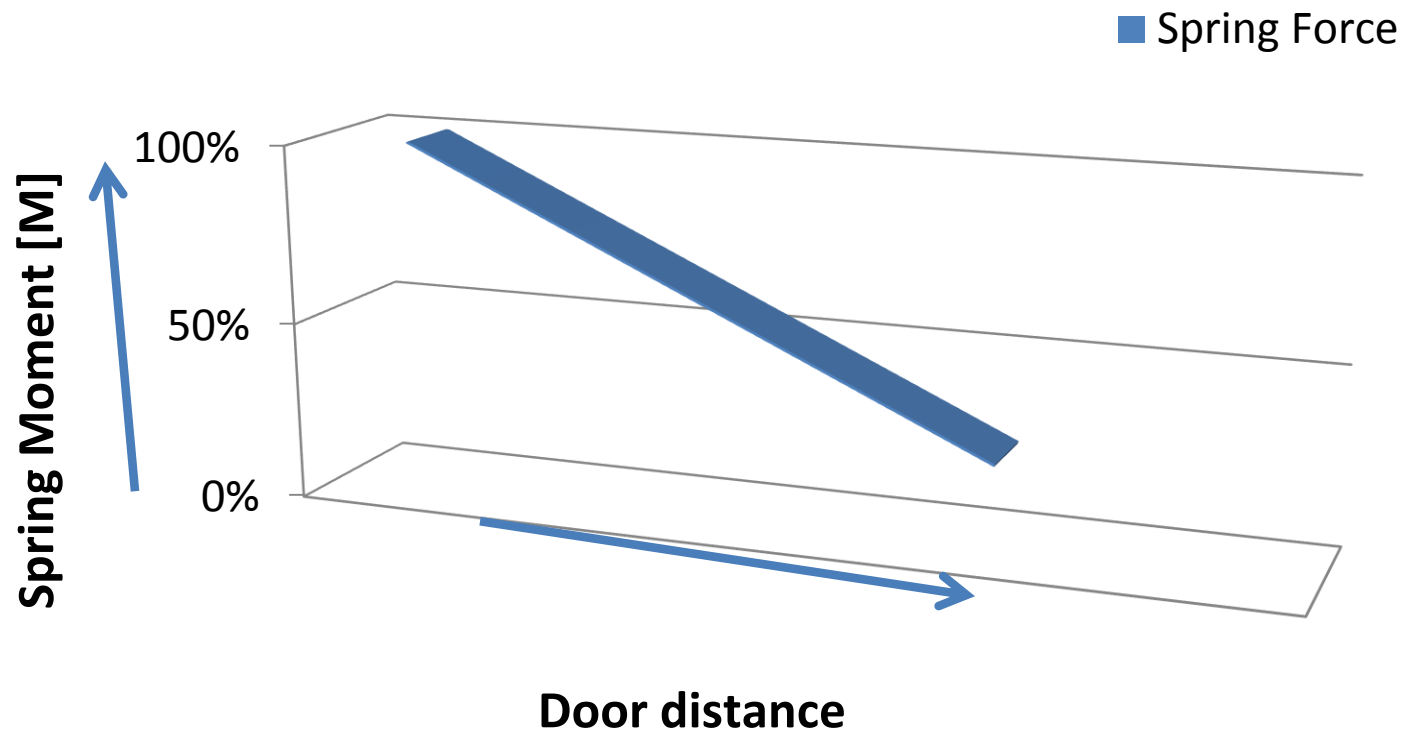
High Lift drum



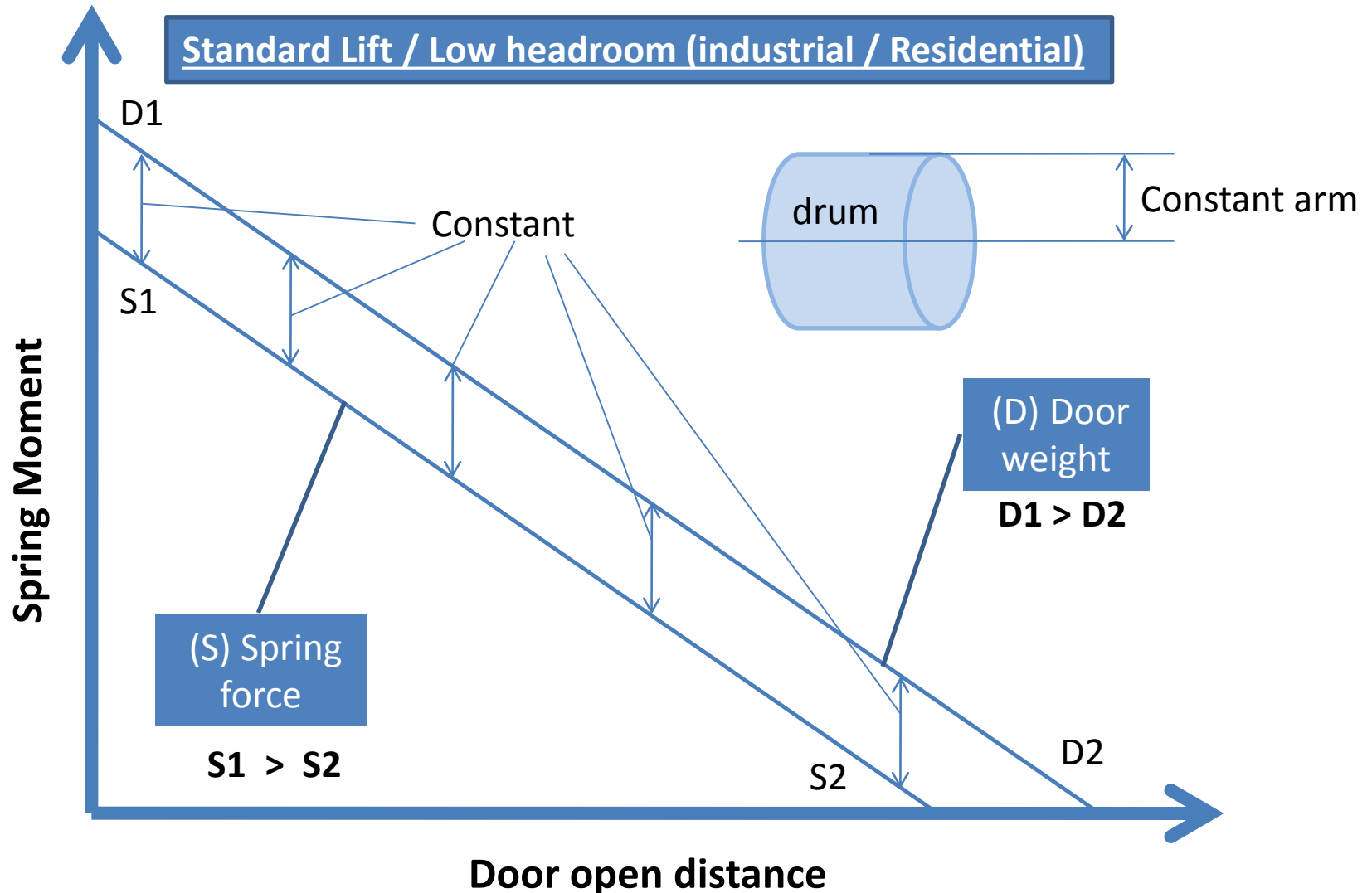
Full Vertical drum



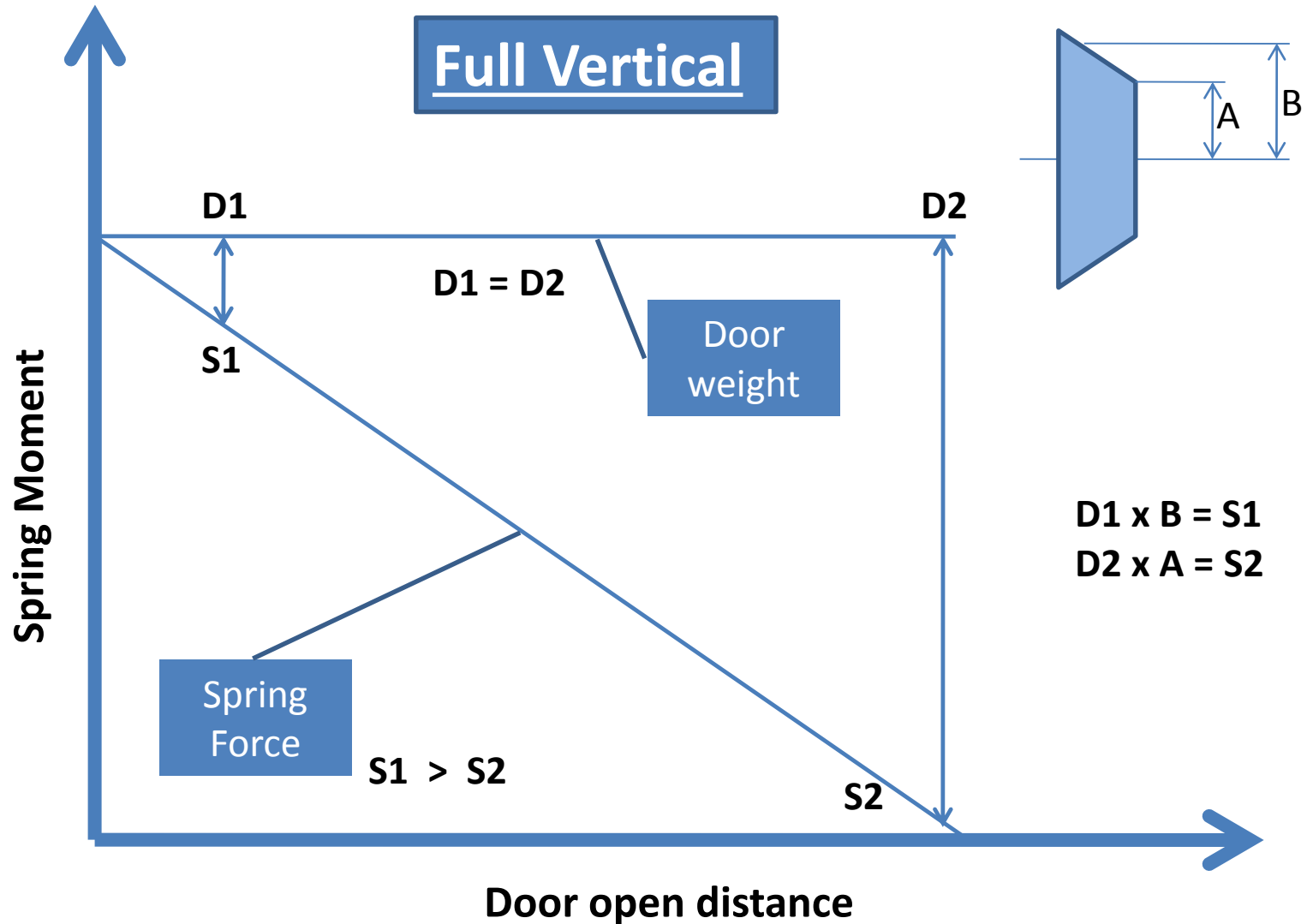
How does a sectional door work?



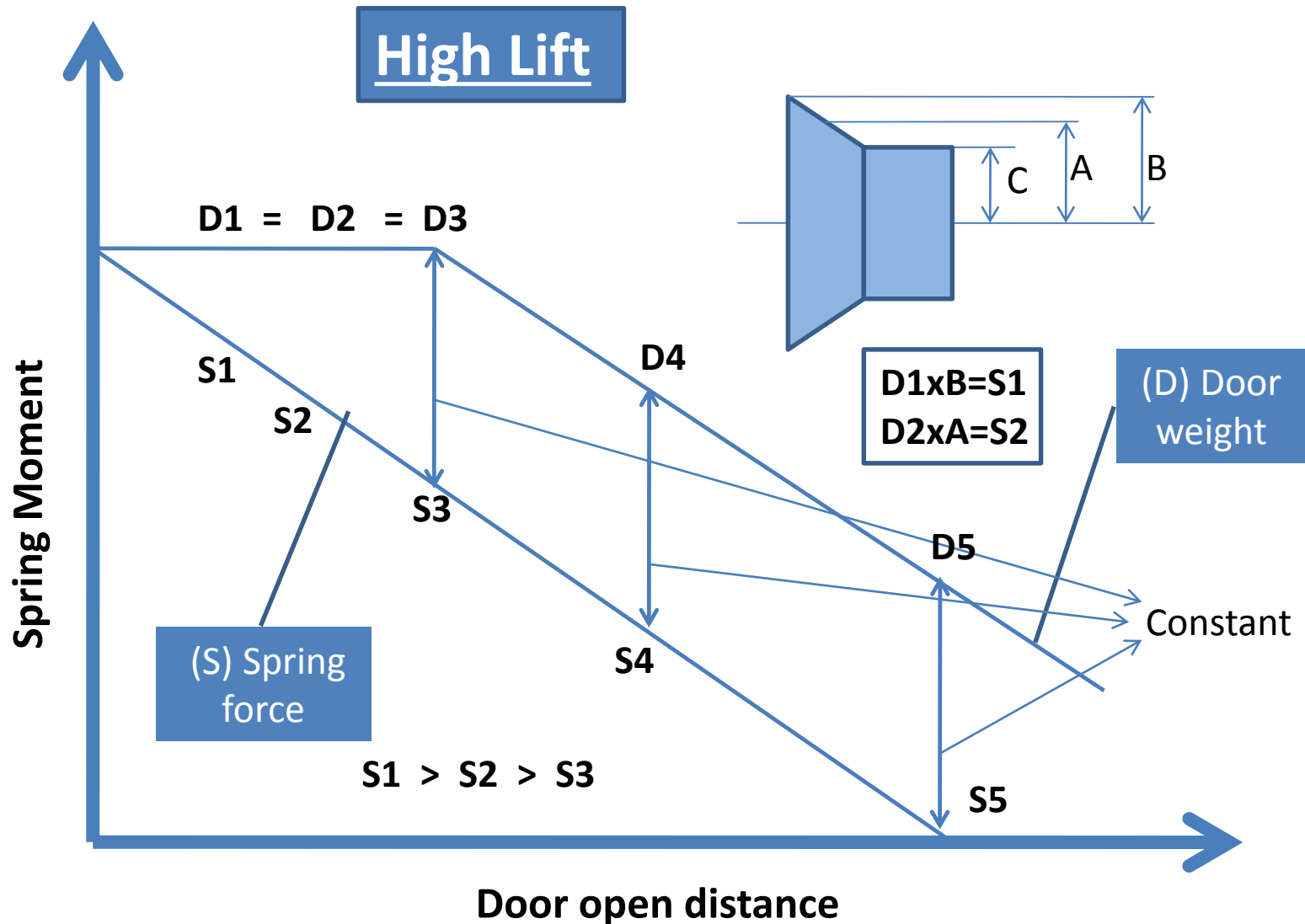
How does a sectional door work?



How does a sectional door work?



How does a sectional door work?

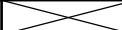
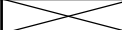
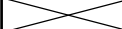
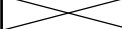
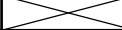

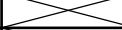
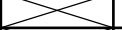
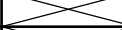
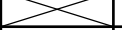
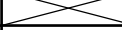
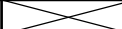
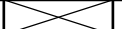
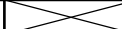
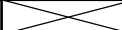
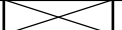
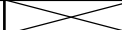
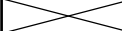
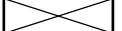
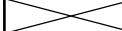
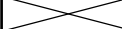
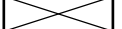
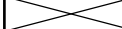
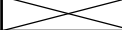
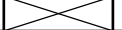
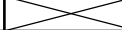




Parts in Detail


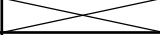


Drums

Identification				Wrapping									
Lift type	Article Numer	Rev.	Drum Code	Max. height at 0,5 safety wrap	Max. high lift at 0,5 SW	High Moment arm at 0,0 SW	High Moment arm at 0,5 SW	Flat Moment arm	Total revolutions of flat part	Total revolutions of spiral incl. 0,5 SW	Rate of Rise of Spiral portion	Circumference of the flat portion	Total cable capacity, including 0,5 SW
						HMA0	HMA1	FMA		REVS	RORSP		
Standard	I1000	.1	M102-2400	2550 mm		57,8 mm	57,8 mm	52,3 mm	6	2	2,75 mm	329 mm	2728 mm
Standard	I1000-3	.1	M102-2400	2480 mm		57,8 mm	57,8 mm	52,3 mm	6	2	2,75 mm	329 mm	2658 mm
Standard	I1001	.1	M102-3125	3070 mm		58,3 mm	58,3 mm	52,8 mm	8,5	1,25	4,4 mm	332 mm	3252 mm
Standard	I1002	.1	M134-5500	5880 mm		74,7 mm	72,5 mm	69,2 mm	12,5	1,25	4,4 mm	435 mm	6106 mm
Standard	I1003	.2	M203-9750 / 32-09	9642 mm		109,4 mm	109,4 mm	104,6 mm	14,5	1	4,8 mm	657 mm	9972 mm
Standard	I1014	.1	M102-3760	3803 mm		58,3 mm	58,3 mm	52,8 mm	10,5	1,25	4,4 mm	332 mm	3985 mm
Standard	I1017	.1	M76-2860	2860 mm		39,5 mm	39,5 mm	39,5 mm	12	0		248 mm	2979 mm
Standard	I1018	.1	M76-3660	3546 mm		39,6 mm	39,6 mm	39,6 mm	14,5	0		249 mm	3670 mm
Standard	I1103	.2	M203-9750 / 32-09	9642 mm		109,4 mm	109,4 mm	104,6 mm	14,5	1	4,8 mm	657 mm	9972 mm
High lift	I1005	.1	M102-1375	3065 + HL mm	1376 mm	72,9 mm	72,9 mm	52,8 mm	9,25	4	5,59 mm	332 mm	4661 mm
High lift	I1006	.1	525-120	4556 + HL mm	1390 mm	91,0 mm	91,0 mm	69,1 mm	10	3,25	7,94 mm	434 mm	6222 mm
High lift	I1006	.2	M134-1375	4564 + HL mm	1384 mm	91,0 mm	91,0 mm	69,1 mm	10,5	3,25	7,94 mm	434 mm	6233 mm
High lift	I1007	.1	D575-120	3650 + HL mm	2987 mm	115,09 mm	115,09 mm	75,41 mm	7,75	5,5	7,94 mm	474 mm	7024 mm
High lift	I1007	.2	M146-3050	3678 + HL mm	2997 mm	115,23 mm	115,23 mm	75,53 mm	7,75	5,5	7,94 mm	475 mm	7038 mm
High lift	I1008	.1	M203-3050	6516 + HL mm	3142 mm	135,6 mm	135,6 mm	104,6 mm	9,9	4,75	7,97 mm	659 mm	10083 mm
High lift	I1108	.1	M203-3050	6516 + HL mm	3142 mm	135,6 mm	135,6 mm	104,6 mm	9,9	4,75	7,97 mm	659 mm	10083 mm
High lift	I1004	.1	M162-4165	5690 + HL mm	4169 mm	137 mm	137 mm	83,9 mm	10,8	6,5	8,76 mm	527 mm	10290 mm
High lift	I1104	.1	M162-4165	5690 + HL mm	4169 mm	137 mm	137 mm	83,9 mm	10,8	6,5	8,76 mm	527 mm	10290 mm
Vertical lift	I1009	.1	I43-11	3350 mm		105,6 mm	105,6 mm	34,1 mm		8	9,53 mm		3682 mm
Vertical lift	I1009	.2	M216-3350	3291 mm		104,7 mm	104,7 mm	34,3 mm		8	9,53 mm		3606 mm
Vertical lift	I1010	.1	M280-5500 / 1100-18	5590 mm		133,4 mm	133,4 mm	34,1 mm		11,75	9,53 mm		6020 mm
Vertical lift	I1012	.1	M343-8500	8401 mm		163,3 mm	163,3 mm	34,75 mm		14	9,53 mm		8924 mm
Vertical lift	I1112	.1	M343-8500	8401 mm		163,3 mm	163,3 mm	34,75 mm		14	9,53 mm		8924 mm

- for high lift = Distance from cable attachment point on the door to shaft plus (+) "value on table" minus (-) amount of high lift.
- For Full vertical = Distance from cable attachment point on the door to shaft plus (+) "value on table" minus (-) door height.
- For Standard lift = Distance from cable attachment point on the door to shaft plus (+) "value on table"
- ** Cable not around the shaft bore
- All data is given with the maximum cable diameter

Drums

Identification				Cable length rule		Dimensions				miscellaneous	
Lift type	Article Numer	Rev.	Drum Code	Distance to add for buttons on cable *	Distance to add for third set screw anchoring *	Diameter shaft	Max. cable diameter	Max. width at hub	Max. outside diameter	Max. door weight	Min. Bearing bracket distance
Standard	11000	1	M102-2400	198 mm		Ø25,4	3 mm	42 mm	Ø 121 mm	240 kg	67 mm
Standard	11000-3	1	M102-2400	190 mm	230 mm**	Ø25,4	3 mm	41 mm	Ø119 mm	240 kg	67 mm
Standard	11001	1	M102-3125	202 mm	272 mm	Ø25,4	4 mm	57 mm	Ø 122 mm	340 kg	67 mm
Standard	11002	1	M134-5500	254 mm	460 mm	Ø25,4	5 mm	92 mm	Ø 152 mm	680 kg	86 mm
Standard	11003	2	M203-9750 / 32-09	360 mm	675 mm	Ø25,4	6 mm	126 mm	Ø 228 mm	1000 kg	127 mm
Standard	11014	1	M102-3760	199 mm	279 mm**	Ø25,4	4 mm	67 mm	Ø 122 mm	340 kg	67 mm
Standard	11017	1	M76-2860	144 mm	154 mm**	Ø25,4	3 mm	52 mm	Ø 84 mm	320 kg	45 mm
Standard	11018	1	M76-3660	145 mm		Ø25,4	3 mm	86 mm	Ø 86 mm	320 kg	45 mm
Standard	11103	2	M203-9750 / 32-09	360 mm	675 mm	Ø31,75	6 mm	126 mm	Ø 228 mm	1000 kg	127 mm
High lift	11005	1	M102-1375	1610 mm	1800 mm	Ø25,4	4 mm	77 mm	Ø 152 mm	250 kg	86 mm
High lift	11006	1	525-120	1696 mm	1816 mm**	Ø25,4	5 mm	92 mm	Ø 182 mm	454 kg	111 mm
High lift	11006	2	M134-1375	1689 mm	1904 mm	Ø25,4	5 mm	93 mm	Ø 189 mm	454 kg	111 mm
High lift	11007	1	D575-120	3368 mm	3508 mm**	Ø25,4	5 mm	95 mm	Ø 234 mm	454 kg	127 mm
High lift	11007	2	M146-3050	3380 mm	3615 mm	Ø25,4	5 mm	95 mm	Ø 234 mm	455 kg	127 mm
High lift	11008	1	M203-3050	3591 mm	3921 mm	Ø25,4	6 mm	132 mm	Ø 285 mm	1000 kg	152 mm
High lift	11108	1	M203-3050	3591 mm	3921 mm	Ø31,75	6 mm	132 mm	Ø 285 mm	1000 kg	152 mm
High lift	11004	1	M162-4165	4660 mm	4865 mm	Ø25,4	6 mm	156 mm	Ø 279 mm	728 kg	152 mm
High lift	11104	1	M162-4165	4660 mm	4865 mm	Ø31,75	6 mm	156 mm	Ø 279 mm	728 kg	152 mm
Vertical lift	11009	1	143-11	3702 mm	3822 mm	Ø25,4	5 mm	80 mm	Ø 215 mm	386 kg	127 mm
Vertical lift	11009	2	M216-3350	3626 mm	3816 mm**	Ø25,4	5 mm	84 mm	Ø 212 mm	386 kg	127 mm
Vertical lift	11010	1	M280-5500 / 1100-18	6020 mm	6340 mm	Ø25,4	5 mm	108 mm	Ø 276 mm	518 kg	152 mm
Vertical lift	11012	1	M343-8500	8924 mm	9319 mm	Ø25,4	6 mm	182 mm	Ø 342 mm	1000 kg	178 mm
Vertical lift	11112	1	M343-8500	8924 mm	9319 mm	Ø31,75	6 mm	182 mm	Ø 342 mm	1000 kg	178 mm

Drums

DOCO has as only one in the market a certificate to use 0,5 Safety Wrapping!



Bescheinigung

über die Endverbindung von Tragsseilen aus Stahldrähten an Trommeln für Tür- und Torantriebe

Antragsteller und Bescheinigungsinhaber:	TORQUE FORCE EUROPE DOCO B.V. Nusterweg 96 NL-6136 KV Sittard
Prüfgegenstand:	Seiltrommeln für Tür- und Torantriebe mit Tragseil-Endverbindung
Prüfgrundlage:	EN 12604 „Tore, Mechanische Aspekte, Anforderungen“, Ausgabe August 2000 Abschnitt 4.7.3
Prüfauftrag, Zweck der Prüfung:	Nach EN 12604:2000/Abschnitt 4.7.3 müssen Endverbindungen von Tragmitteln mindestens 90% der Bruchkraft des Tragmittels aufweisen oder es müssen zumindest zwei volle Windungen in der Endstellung des Tores auf der Trommel verbleiben. Im vorliegenden Fall verbleibt nur eine halbe Windung auf der Trommel. Es ist zu untersuchen, dass auch mit einer halben Windung und der anschließenden Seilführung mit Endklemmung des Seiles ein sicherer Betrieb über die geplante Lebensdauer des Antriebes gewährleistet ist.
Prüfumfang:	Nachbildung des betriebsmäßigen Einsatzes in Versuchsreihen mit unterschiedlichen Trommelau Ausführungen und Durchmesser von Stahldrahtseilen.
Prüfergebnis:	Über die geplante Lebensdauer zeigte sich in den Versuchen eine sichere Endverbindung mit nur einer halben Windung, der anschließenden Seilführung und Seilendklemmung. Es wurden keine Schäden an der Trommel, dem Seil und der Seilendklemmung festgestellt. Es trat keinerlei Rutsch an der Seilendklemmung auf.


Bau und Betrieb

Region Bayern
Fördertechnik
Aufzüge u.
Sicherheitsbauteile

Westendstraße 199
D-80986 München
Telefon (0 89) 57 91-17 12
Telefax (0 89) 57 91-17 96
www.tuev-sued.de
E-mail: Catherina.Schaefer@tuev-sued.de
München, 2005-06-04
BB-FTA-MUC/re-sc
30604_Besch_Torque.doc

Das Dokument besteht aus:
2 Seiten

TÜV Süddeutschland
Bau und Betrieb GmbH
Aufsichtsratsvorsitzender:
Dr. Peter Hüpler
Geschäftsführer:
Roland Axx
Dr. Udo Heisel
Sitz: München
Amtsgericht München
HRB 98 869



Seite 2 von 2
Bau und Betrieb
Unser Zeichen, Erstellungsdatum, Kernzeichnung: BB-FTA-MUC/re-sc München, 2003-06-04
Archivierung: 30604_Besch_Torque.doc


Die Endverbindung mit nur einer halben Windung auf der Trommel erfüllt für alle Trommeltypen der Firma TORQUE FORCE die Anforderungen des Abschnittes 4.7.3 der EN 12604:2000 wenn folgende Bedingungen eingehalten sind:

- Der Durchmesser der Stahldrahtseile beträgt 3 – 6 mm.
- Die Schraube für die Endklemmung des Seiles muss mit einem Moment von 13 Nm dauerhaft angezogen sein, (ausgenommen Trommel 11000, M-102 2400, mit Aluminium Presshülse, 25105/07, als Seilendklemmung).
- Seilführung und Seilendklemmung müssen den Darstellungen auf dem Anhang zu dieser Bescheinigung entsprechen.

Der Bescheinigung zugrunde liegende Unterlagen:


- Prüfbericht des Institutes für Fördertechnik und Logistik, Abt. Seiltechnik und Seilanwendungen vom 23. April 2003
- Katalog der Firma TORQUE FORCE Ausgabe 03.2003 mit Darstellung und Daten der Seiltrommeln
- Konstruktionszeichnungen der im Katalog dargestellten Seiltrommeln

Abteilung
Aufzüge und Sicherheitsbauteile



Weber

Der Sachverständige



Regner

Drums

Function:

- Wind up the cable when door is moving up.
- Hold the door weight
- Connection between door-blade and power-unit, via cables

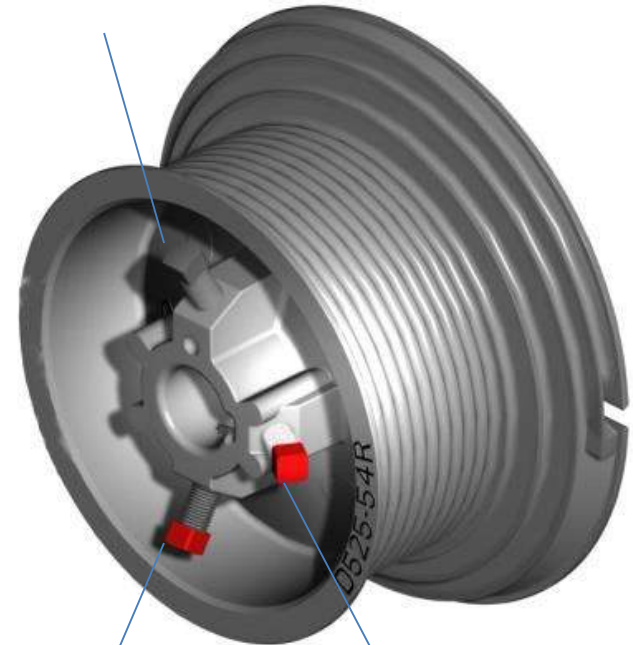
Types:

- Standard lift drums
- High lift drums
- full vertical drums.

Material:

- Die-cast aluminum

Set screw for
fixation the cable



Set screw for
fixation the shaft

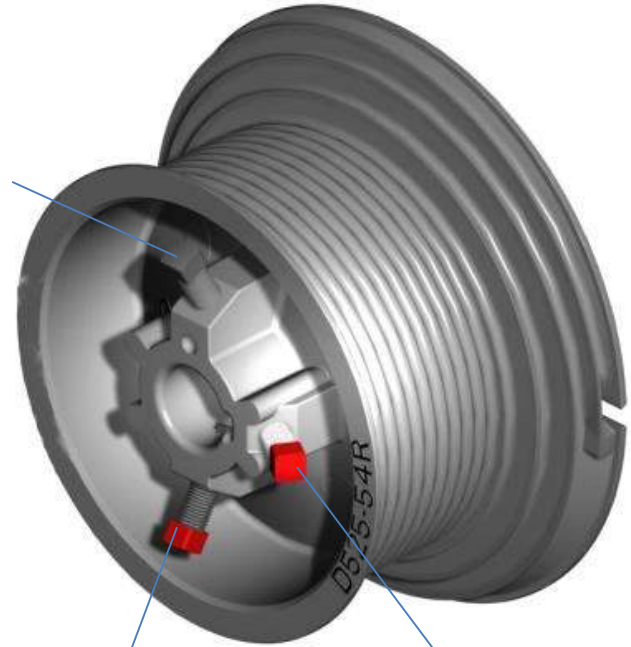
Set screw for
fixation the key

Drums

What Tools to use? => use a torque wrench



Torque = 20 Nm
Cable set screw



Torque = 27-30 Nm

Torque = 27-30 Nm

Use a 7/16" insert or
Use a 11mm insert with **12 recesses!**
Max outside diameter of the insert = 16mm



Drums

regular cable screw:

M8 Din916



Cutting head, it's not designed for fixing cables!!

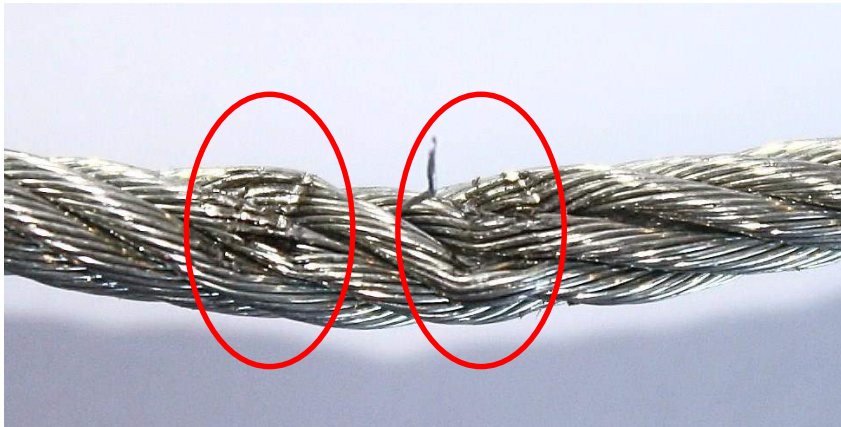
DOCO cable screw:



Special designed for cable fixation!

Drums

**Cable fitted with a
FF cable screw:**



**Cable fitted with a
DOCO cable screw:**



Cable wires are broken



Only Pressed cable with DOCO
special designed cable screw!

Right position cable High Lift Doors

In praxis there is a trick to do this without using the cable length rule!

Sample:

Door 3x3 m HL= 800

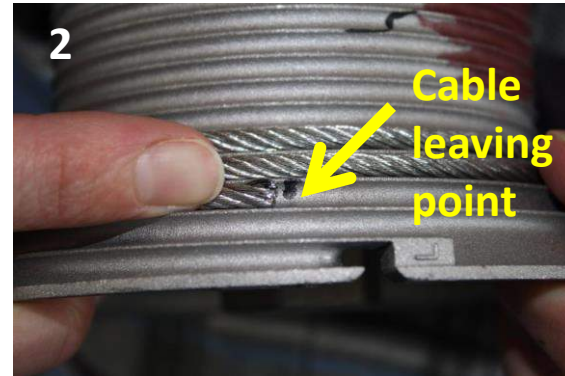
Drum 11005

- 1) Take a cable or small rope with a length of 800 mm.
- 2) Position the cable at the start of the spiral part. (see picture)

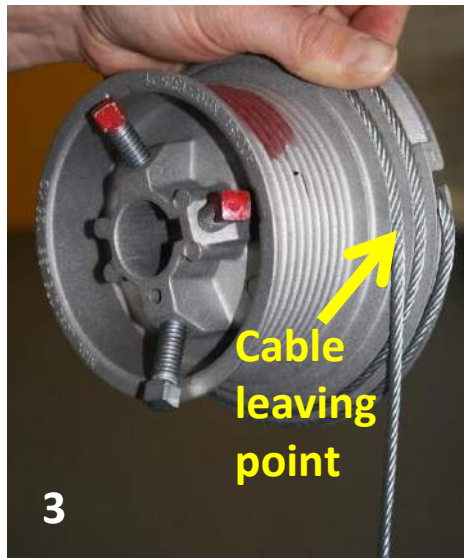


Right position cable High Lift Doors

3) Wind up the cable to the end (800mm) and put a mark (see pictures 1+2).



4) Install the cable from the bottom bracket or cable break device and wind up the cable till the point marked on the drum. (see picture 3)



Right position cable Full-vertical Doors

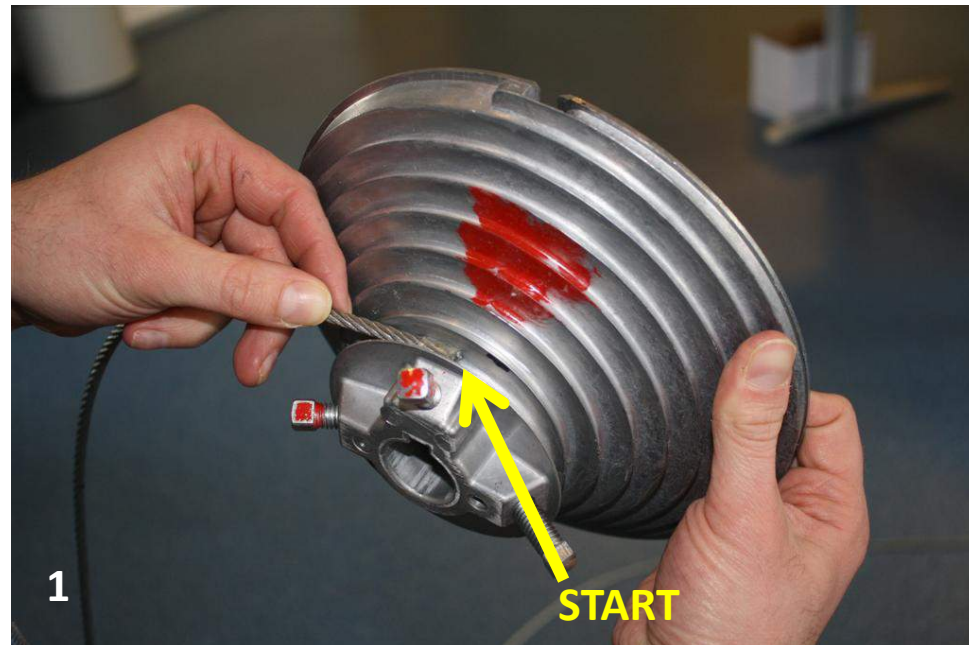
In praxis there is a trick to do this without using the cable length rule!

Sample:

Full vertical Door 3x3 m

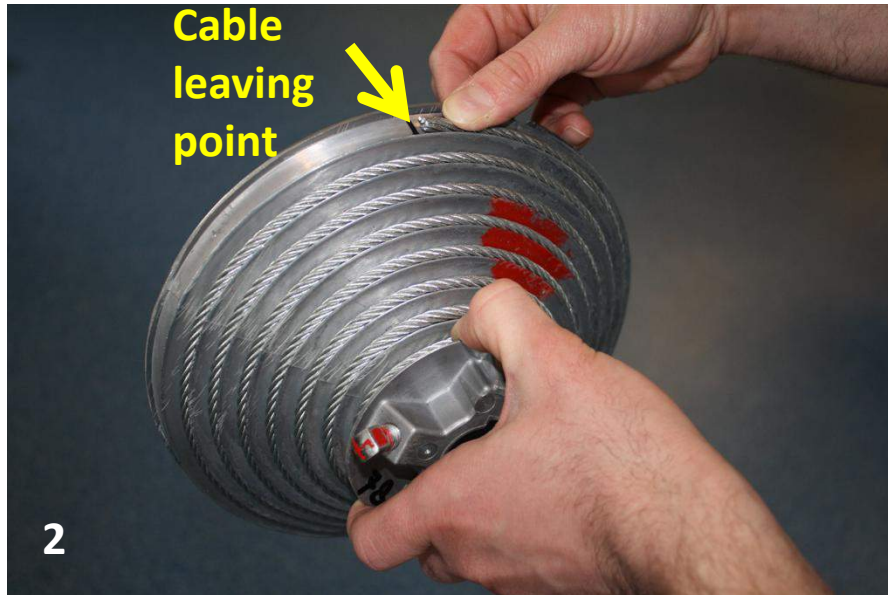
Drum 11009 (max. capacity = 3291 mm)

- 1) Take a cable or small rope with a length of 3000 mm.
- 2) Position the cable at the start of the spiral part. (see picture 1)

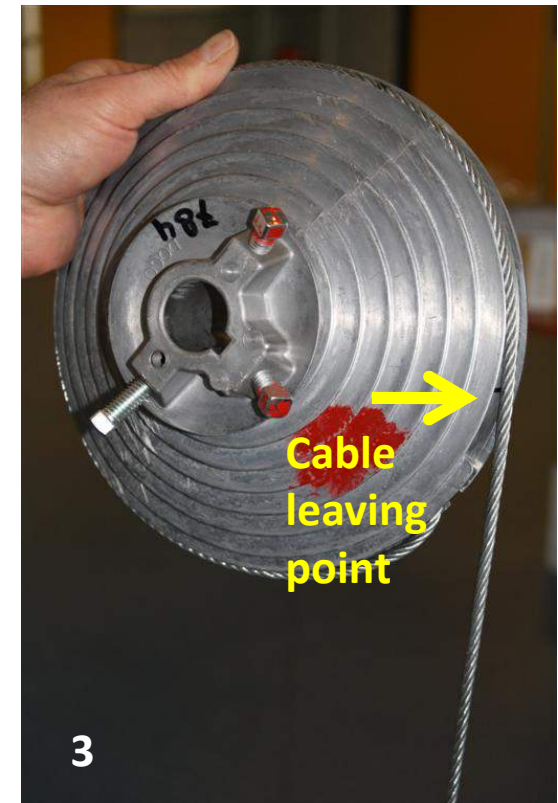


Right position cable Full-vertical Doors

- 3) Wind up the cable to the end (3000mm) and put a mark (see picture 2).



- 4) Install the cable from the bottom bracket or cable break device and wind up the cable till the point marked on the drum. (see picture 3)



Torsion Springs

Function:

- Balance the door.

Material

According: EN 10270-1 SH

Types:

- Blank springs (black).
- Zinc plated springs
- Shot Peened springs.

Example:

95 - 7- 900

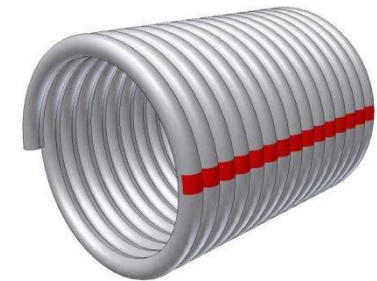
Inside diameter

wire thickness

length



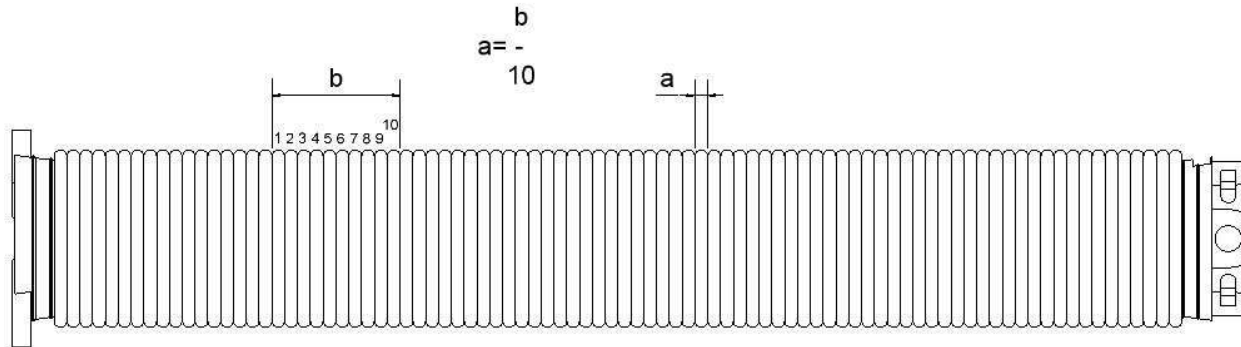
Left spring (black or blue)



Right spring (red)

Torsion Springs

Checking thread thickness:



General:

Spring length* need to be around 8x inside diameter.

*Note: spring length is only the spring, so not including the plugs.

** Checking always NOT tensioned !!

Torsion Duplex Springs

Function:

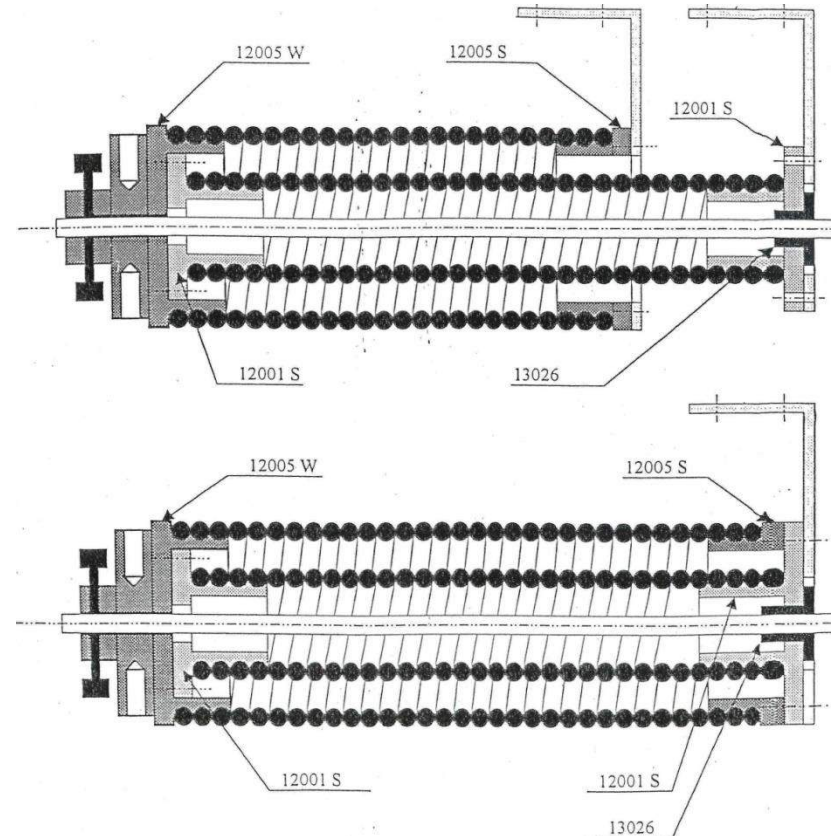
- Balance the door.

Duplex springs <=> Booster springs

It's a 152mm spring with inside a 95mm spring, so more torque with equal length normal 152mm spring.

When used: In case that normal spring does not fit between the door.

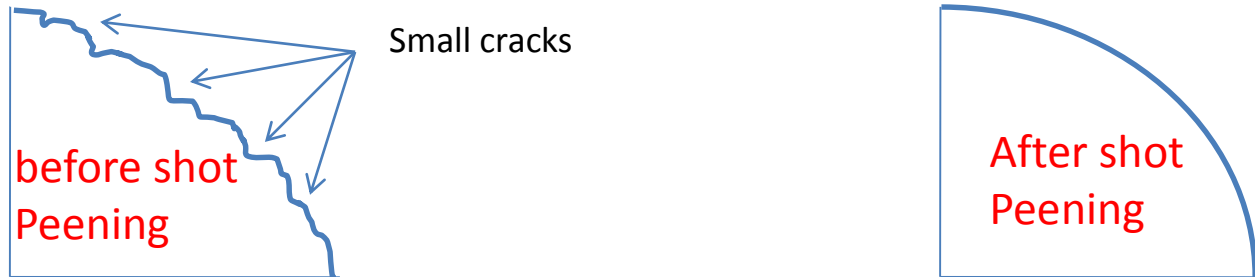
Not CE certified because a spring break device does not work!



Torsion - Springs

Shot Peened Springs.

Shot peening is a process in which a spring will be bombarded in a chamber with small round metallic, glass or ceramic particles to reduce cracks (same kind of chamber as sand blasting of steel profiles). This cold working process will change the properties in a positive way. It reduces the fatigue strength, cracking stress and a better wear resistance. This reduction of stress will give a better lifetime and / or a better Torque performance by using the same diameter wire. Because of this process the outer surface is very sensitive for rust, so that's the reason to coat the spring afterwards.



Advantages of Shot Peened springs:

- Longer life time (mostly industrial springs)
- Less kg spring needed, up to 30% (mostly industrial springs)
- Coated, good looking.

Spring plugs

SPRINGPLUGS:

Function:

- Transform the energy from the spring to the shaft

Types:

1. Stationary spring plug (S)
2. Winding spring plug (W)

Note: almost all type are universal only types 12301 and 12012 are Left / Right

- The Stationary spring plug is connected to the bearing plate or Spring break device
- The Winding spring plug is connected to the shaft
- Type 12002 – 12003 – 12004 are spring plugs based on friction, between spring plug and spring, inside diameter of the spring is very important.
- All other types have there fixation be to bend to tail of the spring (by heating).

Material:

- Die-cast aluminum

Parts in Detail : Spring plugs

Overview:

Diameter spring	Spring dimensions [mm]	Spring plug Stationary	Spring plug winding	Universal thread design	Max. Nm	Diameter shaft
45	5 - 7,5	12004-S	12004-W	yes	72 Nm	Ø 25,4
50	5 - 7,5	12003-S	12003-W	yes	72 Nm	Ø 25,4
67	6,5 - 8	12002-S	12002-W	yes	89 Nm	Ø 25,4
95	8,5 - 10	12001-S	12001-W	yes	157 Nm	Ø 25,4
95	8,5 - 10	12301-SL-SR	12301-WL-WR	no	157 Nm	Ø 25,4
133	9 - 11	12012-SL-SR	12012-WL-WR	no	220 Nm	Ø 25,4
152	9 - 12	12005-S	12005-W	yes	226 Nm	Ø 25,4
152	9 - 12	12105-S	12105-W	yes	226 Nm	Ø 31,75
152	9 - 11	12015-SL-SR	12015-WL-WR	no	220 Nm	Ø 25,4
152-95	see spring	12010-S	12015-W	yes	226 Nm	Ø 25,4

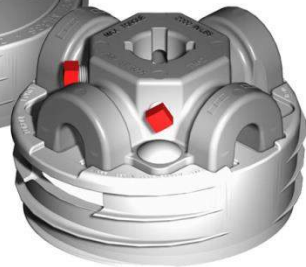
Spring plugs

12002-S



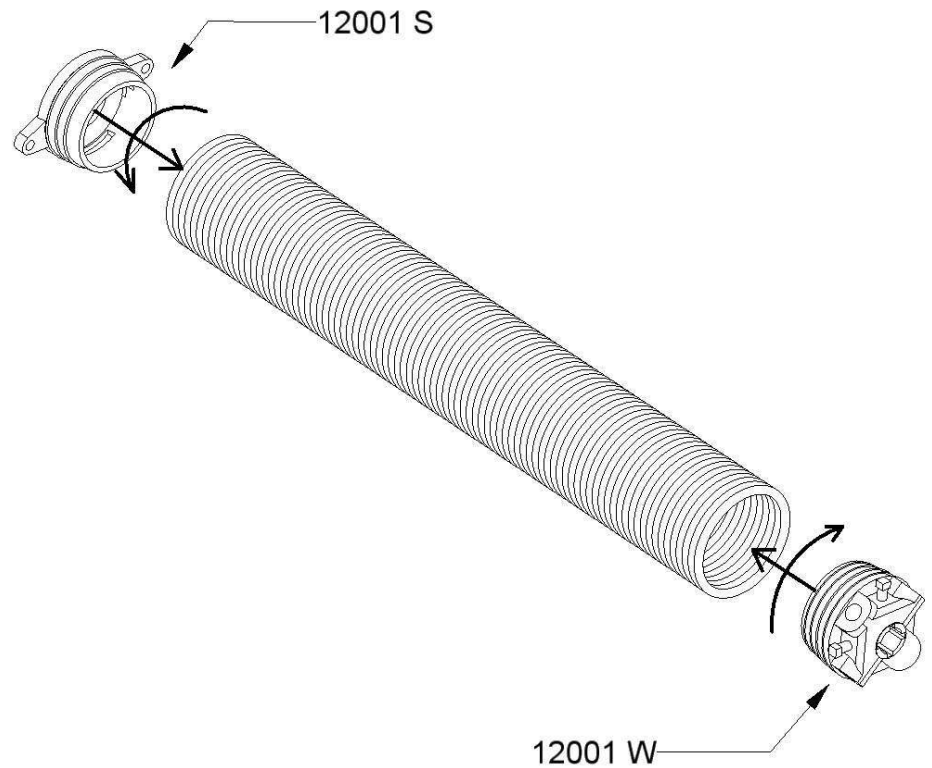
12002-W

12005-S



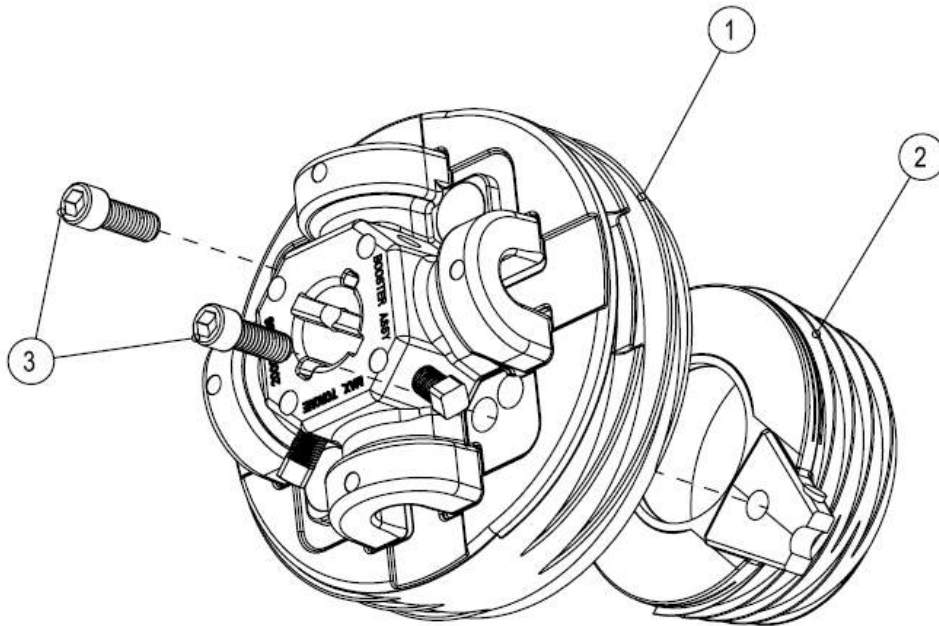
12005-W

Sample:
95mm spring with spring plugs



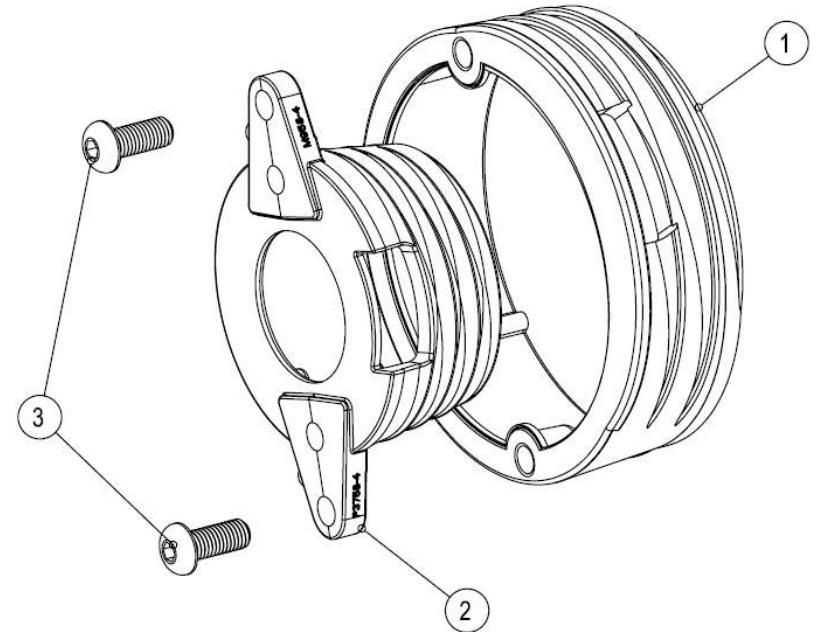
Torsion Duplex Spring Plugs

Winding Plug



NO.	PART NUMBER	DESCRIPTION
1	12005-W	M152 SPRING PLUG
2	12001-S	M95 SPRING PLUG

Stationary Plug



NO.	PART NUMBER	DESCRIPTION
1	12005-S	M152 SPRING PLUG
2	12001-S	M95 SPRING PLUG