Lux Overhead Door
5103 - 8th Street East, Saskatoon, SK S0K 0Y0
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Best Practices for Commercial Overhead Door Systems

Maintenance, Life-Cycle Cost, and Safety Liability

Rev 1.0 CAN

This guide is written for facilities, operations, maintenance and safety managers with responsibility for commercial overhead door systems.

Summary & Best Practices

Even though overhead door systems are very common, they're often overlooked by organizations' maintenance and/or safety programs. This oversight has two main negative consequences:

- **Higher door life-cycle costs** - Overhead doors are constructed of components that wear, fatigue and need replacment during a door's normal life-cycle. Not addressing small problems (eg. frayed cables) often creates bigger problems (eg. a door that falls), which can be much more expensive, and even potentially dangerous.

- **Increased safety liability -** Overhead doors are subject to *Occupational Health & Safety* (OHS) laws in every Province. OHS regulations require overhead doors be inspected and maintained to manufacturers' specifications, as well as be equipped with the appropriate, properly functioning entrapment devices so as to operate safely. Not meeting OHS standards creates both increased safety risk, and significant liability exposure.

Main types of commercial overhead doors:

Sectional doors
Rolling steel service doors
Rolling steel fire doors
High speed doors
Rubber doors
Fabric doors
Rolling grilles

Sectional overhead door

Best Practice Recommendations

Implement a planned maintenance and safety compliance program for all active overhead door systems that meets the standards below.

<u>Standard #1 - Regular Preventive Maintenance</u>

Ensure doors are **installed, inspected and maintained in accordance with the manufacturers' specifications, including maintenance intervals.**

Most doors and motors are made with components that need inspection, adjustment, calibration or replacement during normal lifecycles. For example:

- Lifting cables
- Rollers
- Hinges
- Bearings
- Torsion springs
- Drive belts
- Clutch tension
- Limit settings
- Door balance
- Sensing edge components
- Photo-eyes
- Interlocks

Regular maintenance is not a guarantee against future problems, but finding and fixing small problems before they become big problems usually results in significant cost savings. Moreover, proper maintenance is <u>required</u> under safety law.

Most door systems require maintenance once or twice per year, however, intervals can vary with daily cyclage, operating environment and the manufacturers' recommendations. Below are guideline intervals for sectional overhead doors.

Maintenance Interval Guidelines for Sectional Overhead Doors			
Daily Cycles & Intervals			
≤10 cycles/day	10-25 cycles/day	25-50 cycles/day	>50 cycles/day
12 mos.	6-12 mos.	3-6 mos.	1-3 mos.

Unless there are serious problems, properly maintaining door systems is not expensive. A thorough maintenance service takes about 45 min +/- 15 min per door. Depending on local service rates, the cost for a maintenance service on most doors systems is between $50-$100/door.

Most door systems are made with components that wear, fatigue and need routine replacement during a door system's normal life-cycle. Small problems that are ignored often lead to bigger problems.

Standard #2 - Entrapment Devices

Ensure **motorized door systems are equipped with properly installed and functioning entrapment devices, either photo-eyes or a sensing edge, per manufacturers' specifications.**

Motorized doors can be controlled by a variety of devices in a variety of ways: push button wall stations, remote control transmitters, timers, ground loops, etc. For convenience, many doors are programmed to close automatically (eg. timers), semi-automatically (eg. momentary pressure to close on a push button station), or by radio controls (eg. hand-held remotes). Doors operating in these modes create entrapment risk, and it's important they be equipped with entrapment devices to reverse the door's direction should it encounter an obstruction while it is closing.

Specific standards for entrapment devices can vary with the age of the operator, modes of door control, and the operator manufacturer. Consult with a qualified door dealer to determine the correct entrapment device standards applicable to your particular door systems.

Standard #3 - Documentation

Ensure thorough documentation is created and maintained to demonstrate safety "due diligence" in the case of an incident.

Documentation should include: details of maintenance and service work performed, problems or deficiencies found, corrective action recommended and taken, standards and practices used (eg. manufacturer's O&M manuals or similar documentation).

See example maintenance inspection report below:

Demo Door Co.
345 West Industrial Road
Anytown, USA 58486
p:(555) 555-5555 | f:(555) 444-4444
service@demodoorco.com

Demo Door Co.

Door - PM Inspection
Report Date May 19, 2015 14:09 MDT
This report summarizes inspection results including grades, notes and photographs.

Customer:	Richardson Brothers	Building:	Refurb Center
Address:	17532-14 Ave, Pleasantville, CO, US - 86514		
Contact 1:	Jim Anderson	Contact 2:	Nathan Samuels
Phone:	555-555-4444	Phone:	555-556-2222
Email:	jim.anderson@rinos.com	Email:	nathan.samuels@rinos.com

Door ID & Description	Inspection Date/Time ID
Door ID 0001285	Created Jan 15, 2015 14:09 Not SafedoorPM Compliant
Description PUR 24' x 20' EXO	Finished Apr 22, 2015 7:29 Not Posted
	Signature

Door Notes: 657, mechanic shop door #2

DOOR

GRADE	INSPECTION ELEMENT	NOTES	PHOTO
Pass	Cables, cable anchors, bottom brackets		
Fail	Rollers, roller brackets, end framing, center hinges	[2015-01-15 14:46] FW: Top left-hand side bracket bent, needs to be replaced [2015-01-15 14:46] CW: Multiple hinges loose retightened	YES (2)
Pass	Struts, span braces	[2015-01-15 14:30] CW: Multiple span braces pulled away from panels reattached and added more tech screws	
Pass	Vertical track, brackets		
Pass	Sections, joints, gaskets		
Pass	Windows, glazing		
Pass	Shaft, couplers, drums	[2015-01-15 15:30] CW: Coupler set screws loose, tightened. Right-hand side drum set screws loose, tightened.	
Pass	Bearings, bearing plates		
Pass	Torsion springs		
Fail	Door level, balance	[2015-01-15 15:32] FW: Door heavy recommend two turns	
Pass	Horizontal track		
Pass	Pusher springs, bumpers, stops		
Pass	Back hanging		
Pass	Door safety labeling		

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Door - PM Inspection
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DOOR

Pass	Weatherstrip, U-rubber, top flap	[2015-01-15 15:35] FW: 3 inch bottom u rubber flattened, recommend replacing, bottom retainer okay	
Pass	Fail safe bottom brackets		
Pass	Door operation		

OPERATOR

GRADE	INSPECTION ELEMENT	NOTES	PHOTO
Pass	Operator mounting and anchoring		
Pass	Spreader bar		
Pass	Drive gear		
Pass	Clutch (force), brake		
Pass	Limits		
Pass	Electrical, enclosure		
Pass	Manual release, emergency chain hoist		
Pass	Wall control station		
Pass	Operator safety labeling		
Pass	Protective operator cover		
Pass	Photo-eyes - primary	[2015-01-15 14:10] GN: Photo eyes have been removed. Door is in constant pressure mode to close	
Fail	Sensing edge - secondary	[2015-01-15 14:16] FW: Door needs Road hose	YES (1)

PHOTOS

0001285	Rollers, roller brackets, end framing, center hinges	0001285	Rollers, roller brackets, end framing, center hinges	0001285	Sensing edge - secondary

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What Now? Next Steps

Do not ignore your door systems. Neglected doors simply become less reliable and potentially more hazardous over time. If your doors are not being properly maintained currently, take action by having an initial inspection and service done to establish a baseline of door condition, performance and safety compliance. Then, take it from there ...

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Occupational Health & Safety Requirements

Overhead doors systems are subject to Occupational Health & Safety compliance requirements in every Province (see table below). OHS standards fall under two main categories:

- **General Duty Clauses** – These provisions, such as Division 3(115)(1) of Part 3 Occupational Health and Safety of the Workers Compensation Act of B.C., require employers to exercise "due diligence" to ensure the health and safety of employees in the workplace.

- **Manufacturers' Specifications** – OHS regulations in many jurisdictions specifically require equipment, which includes door systems, be installed, maintained, and configured according to manufacturers' specifications and recommendations. One such example would be Part 3(12)(d) of Alberta's Occupational Health and Safety Code which states, "an employer must ensure that equipment and supplies are … serviced, tested, adjusted, calibrated, maintained, repaired … in accordance with the manufacturers' specifications …".

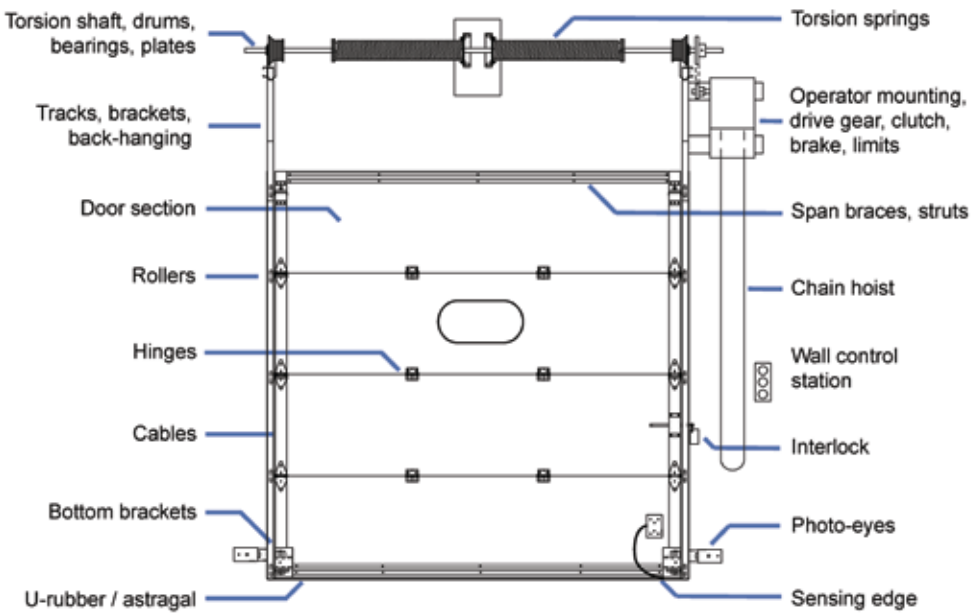
	Applicable OHS Legislation and Regulation
British Columbia	Division 3(115)(1) of Part 3 Occupational Health and Safety of the *Workers Compensation Act* Section 4.3(2)(a) and Section 4.1 of Occupational Health and Safety Regulations
Alberta	Section 2(1) *Occupational Health and Safety Act*, Revised Statutes of Alberta Part 3(12)(d) Alberta Occupational Health and Safety Code
Saskatchewan	Part III, Division 3, 3-8(a) of *The Saskatchewan Employment Act, Occupational Health and Safety* Part III (12)(a) and 25(1) of the Saskatchewan Occupational Health and Safety Regulations
Manitoba	Section 4(1)(a) and Section 4(2)(a) of the *Workplace Safety and Health Act* Section 16.4(2) and Section 16.4(3) of the Workplace Safety and Health Regulation
Ontario	Part III Section 25(1)(b) and Section 25(2)(h) of the *Occupational Health and Safety Act*
Quebec	Division II Section 2(51) An Act respecting occupational health and safety
Nova Scotia	Section 13(1)(a) and Section 13(1)(b) of the *Occupational Health and Safety Act* Part 8 Section 84(1) of the Occupational Safety General Regulations
New Brunswick	Section 9(1)(a) and Section 9(2)(a) of the *Occupational Health and Safety Act* Section 114(1), Section 114(2), and Section 235(1) of New Brunswick Regulation 91-191
PEI	Section 12(1)(a) and Section 12(1)(b) of the *Occupational Health and Safety Act* Section 30.3(1) of the Occupational Health and Safety Act General Regulations
Newfoundland & Labrador	Section 4 and Section 5(a) of the *Occupational Health and Safety Act* Section 14(1), Section 18(1), Section 88(1), and Section 88(2) of the Occupational Health and Safety Regulations

Sectional Overhead Doors

How They Work

Sectional doors are constructed of door “sections”, usually 24“ high, which are stacked one on top of the other, and fastened together with hinges. The door articulates as it opens and closes, with its path guided by rollers that travel in steel tracks secured to the building.

Sectional doors utilize a simple counterbalance system where the weight of the door is offset by the potential stored energy of a pre-wound torsion spring. The torsion spring helps rotate the torsion shaft and drums, which in turn spool the lifting cables (also attached to the door’s bottom brackets) to lift the door. The torsion assembly and related components are under extreme tension.



What You Need to Know

1. Many door components, such as hinges, bearings, cables and rollers, wear and fatigue with use, and require routine replacement. Left uncorrected, problems with smaller components can esclate into larger problems that affect the overall performance and safety of the door.

2. Sectional doors can become dangerous if the counterbalance system is compromised (eg. lifting cables break, become unspooled from the drums, or detach from the bottom brackets). If this occurs when the door is in an open position, the door can be at risk to fall.

3. There are several accessories available for sectional doors to improve safety: safety bottom brackets, spring failure safety devices, cable tension springs. Talk to your door dealer to learn more.

Components

Bottom brackets anchor the lifting cables to the door. They're under significant tension from the counterweight forces of the torsion springs, and it's important they be securely fastened to the door.

Cables support the entire weight of the door and are under tension from the torsion springs. Undersized or frayed cables can break, leaving one or potentially both sides of the door unsupported. It is common for cables to need replacing several times over a door’s life.

Rollers guide the door in the tracks. It is common for rollers to wear and need replacing. Failed rollers can potentially impede the free movement of the door and cause it to jam in its tracks.

Tracks, brackets, back-hanging position and support the door to the building structure. Ceiling support of the tracks, called “back-hanging” is especially important as it supports the door in the fully open position.

Hinges connect the sections of the door and allow articulation. Poorly secured or aligned hinges can cause improper door movement and damage to sections or other parts of the door system.

Span braces and struts attach across the width of the door to provide lateral stiffness. Without proper span brace support, a door can be vulnerable to “bowing” or high wind conditions, both of which can cause a door to dislodge from its tracks.

Torsion springs provide the counterbalance force to the weight of the door and possess a large amount of stored mechanical energy. Broken torsion springs cause abnormal loading on door and electric operator components. Most torsion springs are rated for 10,000 cycles-to-failure and will likely need to be replaced at least once during a door’s life. It is generally not possible to determine how many cycles are left in a torsion spring by visual inspection.

Torsion shaft, drums, bearings are the mechanical and structural components of the torsion assembly. Potential problems include: failed bearings, worn shafts, misalignments, loose couplers, improperly secured brackets, and cracked drums.

Pusher springs, bumper springs and stops prevent the door from running off the end of the tracks. Pusher springs are installed to maintain cable tension on certain door configurations.

Interlocks should be installed on doors with locks and motorized operators to prevent the operator from attempting to open the door when it is locked.

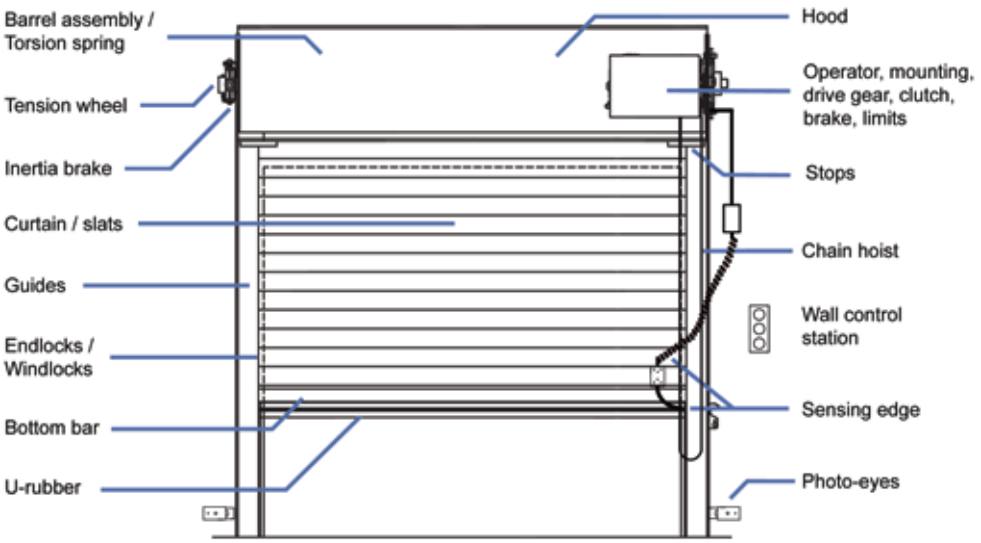
Rolling Steel Service Doors

How They Work

Rolling steel doors are constructed of many individual steel slats, usually 2-3" high, which attach to each other and create a continuous vertical "curtain." The curtain/slat assembly travels in channels in the door guides located on either side of the door, and "rolls" up into the head assembly, where it wraps around a barrel.

The weight of the curtain is counterbalanced by a torsion spring located inside the barrel. The balance of the door is adjusted using the tension wheel located at the end of the barrel assembly, which increases or decreases the tension on the spring.

Rolling steel service doors are often used in applications requiring greater security, where insulation value is not critical, or where there are space constraints.



What You Need to Know

1. Torsion springs are a critical component of the door, and special care should be taken to ensure they are tensioned properly and replaced before they fail. Most torsion springs are designed with a lifespan 10,000 or 20,000 cycles, after which they becomes prone to failure. Implementing a program of proactive spring replacement can reduce operational disruptions related to "emergency" spring failures.

2. Safety inertia brakes can prevent the door from suddenly falling in the event of a torsion spring failure.

Components

Barrel assembly/torsion spring provide the counterbalance force to the weight of the door, lessening the force needed to open and close the door. The torsion spring is located inside the barrel assembly, limiting access and making visual inspections impractical. Torsion springs are typically rated 10,000 or 20,000 cycles-to-fail, making it important to track door usage to replace the spring before it fails.

Tension wheel is the component used to adjust the torsion springs balance. Adjusting the wheel will either increase or decrease tension on the doors torsion spring. The tension wheel is a direct connection to the torsion spring and possess a large amount of mechanical energy. If the tension wheel becomes loose or the mechanical connection to the spring is lost the operator will be subject to abnormal loading.

Inertia brake prevents the door from free falling by stopping the doors movement if a maximum RPM threshold is reached. Some inertia brakes work by communicating with the operator and some physically lock the shaft in place. Inertia brakes that physically stop the shaft can only be triggered so many times before needing replacement.

Endlocks/windlocks lock individual slats into the guides. Broken or loose endlocks can interfere with door movement by catching in the guides.

Stops physically prevent the door from running beyond the upper or lower limits. Stops are used along with limit switches to ensure the door does not overrun the guides.

Hood protects the curtain as well as shields moving components of the door from the elements. A damaged hood can interfere with the curtain and potentially damage it.

Guides are the channels in which the curtain moves. It is important the gap between guides is correct and the curtain is able to move freely. Obstructed movement due to damaged guides can exert an abnormal load on the operator.

Motorized Door Operators

How They Work

Because of their size and weight, many commercial overhead doors are equipped with motorized, electric operators. The most common type are “hoist” (or “jackshaft”) operators which mount near the torsion assembly, and open/close the door by rotating the torsion shaft.

Operators can be controlled by a variety of devices in a variety of ways: push button wall stations, remote control transmitters, timers, ground loops, etc. For convenience, many operators are programmed to close automatically (eg. timers), semi-automatically (eg. momentary pressure to close on a push button station), or by radio controls (eg. hand-held remotes). Doors operating in these modes create entrapment risk, and should equipped with entrapment devices that reverse the door’s direction should it encounter an obstruction while it is closing.

Entrapment Devices

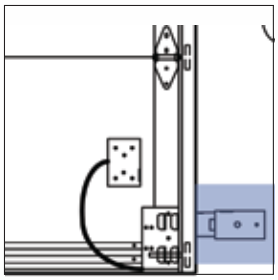
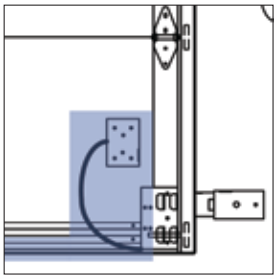


Photo-eyes emit a small light beam from a transmitter to a receiver across the width of the door opening at a height of 6” from the floor. If the light beam is interrupted when the door is closing, the operator reverses the door and holds it in a fully open position.

Photo-eyes can be “monitored” or “non-monitored” depending on their own capabilities and the capabilities of the operator. "Monitored" means the proper functioning of photo-eyes is frequently checked by the operator’s electronics, and should a problem be detected, the operator reverts to a “safe” mode restricting how the door can be closed. "Non-monitored" photo-eyes are not self-checking, and therefore offer a reduced level of safety.



Sensing edges are positioned on the bottom, leading edge of the door, and can detect physical contact with an object. If the sensing edge comes into contact with an object while the door is closing, a signal is sent to the operator to reverse the door to the fully open position.

Like photo-eyes, sensing edges can be "monitored” or “non-monitored” depending on their capabilities and those of the operator.

What You Need to Know

1. Entrapment devices are a critical safety component of motorized door systems. Their proper specification, installation and function are a core safety and compliance concern. Wherever reasonably practicable, doors should be equipped with “monitored” entrapment devices.

2. Modes of control affect entrapment device standards. The more “hands-off” the door’s operation (eg. automatic timer control), the higher the standard for entrapment devices.

3. All operator manufacturers call for (at a minimum) monthly checks of entrapment devices. These checks should be a routine part of your safety program.

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About the Author

Garth Thomas is the President of Safedoor Planned Maintenance Ltd. , a software company which provides planned maintenance and safety compliance software, called SafedoorPM, to the overhead door industry. SafedoorPM is used by door dealers and large organizations (eg. municipalities) to better perform, manage and record commercial maintenance and safety compliance work. www.safedoorpm.com

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