

AIR FORCE
QUALIFICATION TRAINING PACKAGE (AFQTP)



FOR
STRUCTURAL
(3E3X1)

MODULE 30

VEHICLE AND EQUIPMENT FACILITY DOORS

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VEHICLE AND EQUIPMENT FACILITY DOORS

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Career Field Education and Training Plan (CFETP) references from 1 August 2002 version.

OPR: HQ AFCESA/CEOF
(SMSgt Dan Sacks)
Supersedes AFQTP 3E3X1-29, 14 Jul 00

Certified by: HQ AFCESA/CEOF
(CMSgt Myrl F. Kibbe)
Pages: 17/Distribution F

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INTRODUCTION

Before starting this AFQTP, refer to and read the "[AFQTP Trainer/Trainee Guide](#)"

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. **It is important for the trainer and trainee to understand** that an AFQTP **does not** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:

AFQTP completion
Hands-on certification

Diamond task:

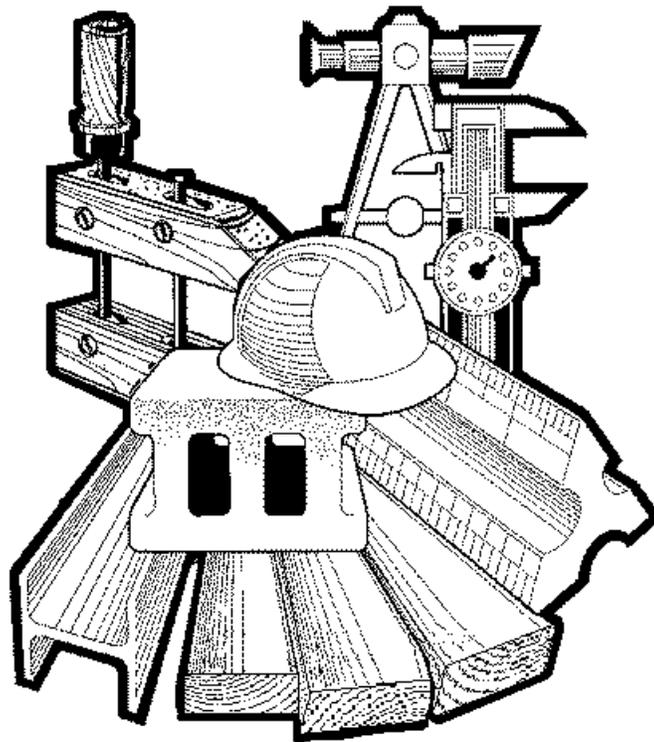
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOF revised this AFQTP. If you have any recommendations for improving this document, please contact the Career Field Manager at the address below.

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VEHICLE AND EQUIPMENT FACILITY DOORS

MODULE 30

AFQTP UNIT 1

INSPECT METAL DOORS (30.1.)

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INSPECT METAL DOORS
Task Training Guide

STS Reference Number/Title:	30.1. - Inspect metal doors.
Training References:	<ol style="list-style-type: none"> 1. Career Development Course (CDC) Structural Journeyman 3E351C, Volume 4, Unit 4; <i>Rollup Doors, Overhead Doors, and Gates</i>. 2. Manufacturer's instructions on Rollup and Overhead doors.
Prerequisites:	<ol style="list-style-type: none"> 1. Possess as a minimum a 3E351 AFSC. 2. Review the following references: <ol style="list-style-type: none"> 2.1. CDC Structural Journeyman 3E351C, Volume 4, Unit 4. 2.2. Manufacturer's instructions.
Equipment/Tools Required:	<ol style="list-style-type: none"> 1. Overhead door. 2. Rollup door. 3. Paraffin wax. 4. Silicon spray (if applicable).
Learning Objective:	Trainee will perform inspection and maintenance on Overhead and Rollup doors successfully.
Samples of Behavior:	Trainee will perform inspection and maintenance on Overhead and Rollup doors successfully while adhering to all safety requirements.
Notes:	
<ol style="list-style-type: none"> 1. This is a 7-level core task. 2. Any safety violation is an automatic failure. 	

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INSPECT METAL DOORS

1. Background. Metal doors are used throughout the Air Force to not only provide entrance or passage into a room or building, but to provide security to personnel and equipment. The proper operation of these doors is critical to mission accomplishment. These doors must be inspected regularly to ensure proper operation and avert mishaps that may cause personnel injury or property damage. As a structural craftsman, you may be responsible for conducting these inspections. In this unit, we will go through the process of inspecting overhead and rollup doors.

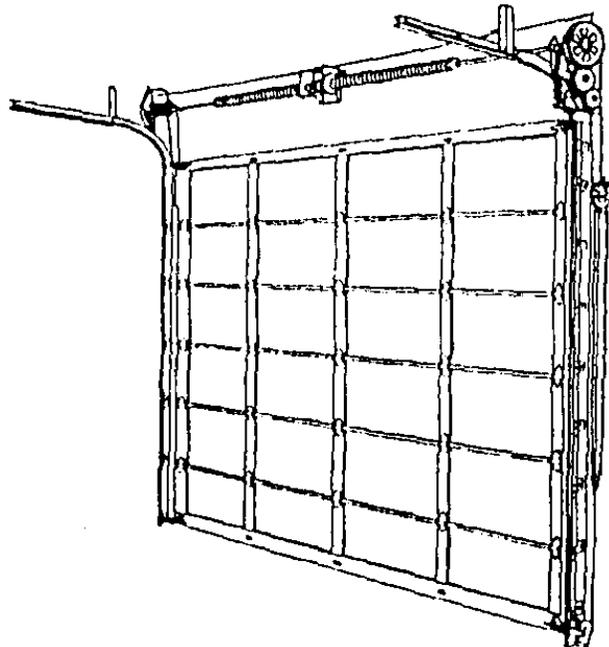
2. Overhead Doors.

2.1. An overhead door is made up of a number of large panels. These panels are hinged horizontally with rollers mounted at each end of the panels. The rollers ride in tracks attached to the building. These tracks run vertically to a certain point off the floor, and then turn horizontally, as shown in Figure 1-1. As the door is raised, it is displaced overhead. The door's weight is counterbalanced with torsion springs attached to a steel shaft mounted to the wall above the door opening. At the shaft ends are cable spools or drums that hold the cable that connects the shaft to the bottom of the door. Force is transferred to the cable, creating a lift that neutralizes the excessive door weight when the correct amount of torsion is placed on the spring. Turning the shaft that these springs are attached to will raise the door. The shaft of both the overhead and rollup doors may be turned either electrically or manually.

NOTE:

Due to the different makes and models of doors on a base it is advisable to always refer to the manufacturers manual for proper inspections and repairs.

Figure 1-1. Overhead Door.



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2.2. Procedures. Follow these steps to inspect an overhead door:

Step 1: Conduct a visual inspection.

- 1.1. Ensure the door is sitting in the opening squarely and evenly.
- 1.2. Tension has been lost from the low side if the door appears to be at a slight angle, preventing the door from operating properly.
 - 1.2.1. This could be as easy as a broken cable, centerline coupler has slipped, cable jumping off the spool or as complex as the spring losing its ability to hold tension.
 - 1.2.2. If you find discrepancies while doing your inspections, make note of them and have them repaired immediately. Any discrepancies make the door very unsafe to operate.

SAFETY:

IF THE OVERHEAD DOOR LOOKS UNSAFE, STOP THE INSPECTION AND HAVE IT REPAIRED IMMEDIATELY.

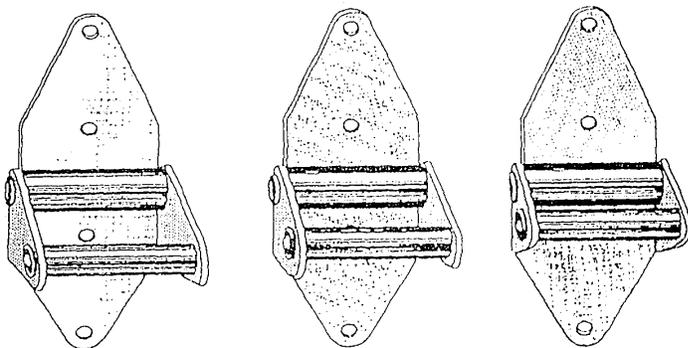
Step 2: Inspect hinges (See Figure 2-2).

- 2.1. Check the hinges for loose or missing screws.
- 2.2. Hinges should pivot freely (not stiff or pivoting improperly).
- 2.3. If the hinges are not pivoting properly, check to see why. It could be as simple as paint buildup causing the hinges to freeze/lock up, or the hinges could be bad and need to be replaced.
- 2.4. Damaged hinges need to be replaced or repaired. In most cases, it's faster and more efficient to merely replace the damaged hinge.

SAFETY:

CAUTION MUST BE OBSERVED WHEN REMOVING A HINGE CONTAINING A ROLLER. THE DOOR WILL TEND TO BOW TOWARDS YOU. REMOVING MORE THAN ONE HINGE FROM THE SAME ROW OF HINGES COULD ALLOW THE DOOR TO COLLAPSE.

Figure 2-2. Overhead Door Hinges.



NOTE:

The hinges on the end of the panels closest to the track have a slot for a roller. The rollers should be able to slide freely inside the hinge to allow for minor door shifting. Take note of the different hinge points on these hinges. This difference in spacing allows for the panels on the overhead door to pivot correctly as it goes up the track.

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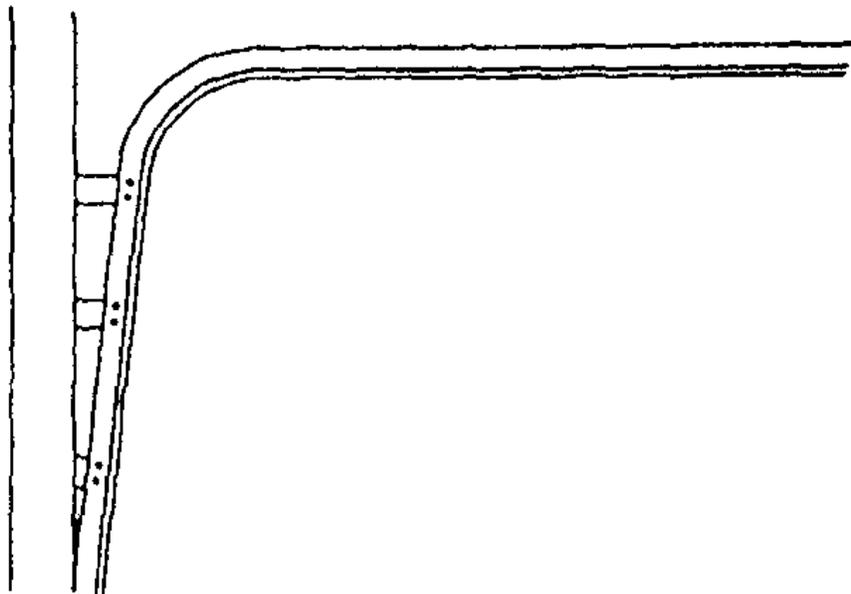
Step 3: Inspect the track and rollers (See Figure 2-3).

- 3.1. Look at the track and ensure it is bolted or welded to the wall or jamb.
 - 3.1.1. Check to see if it is firmly secured and not loose. You can do this by grabbing the track and shaking it.
 - 3.1.2. The top of the track should have an offset. This offset allows the overhead door to clear the top of your jamb opening as it is raised.
- 3.2. Check that the bolts or welds are not damaged or missing.
 - 3.2.1. Damaged or missing bolts or welds could put undo stress on the track. The track could separate from the wall and possibly result in equipment damage or personnel injury.
 - 3.2.2. Inspect the entire length of both tracks to ensure the rolled edge has not flattened out. This could allow the rollers to come off the track.
- 3.3. Check the rollers to ensure the ball bearings are in place, the roller shaft is not bent and the rollers rotate smoothly.

NOTE:

Do Not oil or grease the track and rollers. The oil or grease acts like a magnet to dust and dirt causing the part to wear at a faster rate. Paraffin wax can be used in the track and very small amounts of silicon spray can be placed in the rollers to prevent rust and corrosion.

Figure 2-3. Track Offset.



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Step 4: Check Cables.

4.1. The cable is the direct link connecting the counterbalance system to the door weight. The cables are attached at the top to the cable spool or drum and at the bottom directly to the door as seen in Figure 2-4. There are numerous reasons why one cable would be looser than the other one. For example: cable connections come undone, cable spools slip, or the door was brought down too hard allowing the spring to unwind a little more on one side than the other.

4.2. Check for any frayed, loose or slipped cables and loose connections.

4.2.1. If a cable should snap while in the up position, it could cause the door to jamb open, preventing the building from being secured or it could cause the other side to come undone and the door to drop to the floor causing damage to the bottom panels.

4.2.2. If the cable snaps while being raised, it could also cause injury to the operator.

Step 5: Inspect the Cable Spool/Drums. The cable spool, or cable drum as it is sometimes referred to, is used to take up the cable as the door is raised. The door size determines the drum size. The taller the door, the more cable required, thus the larger drum needed to take up the cable.

5.1. Inspect that the cable spool/drum is attached to the door shaft by two bolts threaded through the spool/drum and tightened to the shaft as to grip it. Shafts of larger doors normally have a keyway as well to help prevent the drum from slipping on the shaft.

5.2. A keyway is a narrow slot machined into the ends of the shaft that correspond to a slot in the drum. A key, or a piece of hardened square stock, is inserted into the keyway and the drum is slipped over the key, thus locking the shaft and drum together.

5.3. Look for these things when inspecting the cable spool/drum:

5.3.1. The key is properly inserted and not about to slip out.

5.3.2. The bolts are securely attached in the drum.

5.3.3. The drum is not cracked or chipped.

5.4. Inspect that the cable is attached to the spool/drum.

Step 6: Check the springs (See Figure 2-4 on the next page). The springs are the key to the whole counterbalance system. The number of springs on each door depends on the door size. Small doors could have one spring and larger doors could have as many as six; however, the most common number is two.

6.1. Check the springs at the top of the door.

6.2. Check for tension on the springs. If the door is hard to lift, there is not enough tension. If the tension is too great, the door may stay in the open position.

6.3. If a spring is knotted and twisted, chances are the spring has sprung and is unable to hold the proper tension. In this case, the spring will require replacement.

SAFETY:

THERE IS A GREAT AMOUNT OF TENSION ON THE SPRINGS. MAKE CERTAIN ALL SAFETY PRECAUTIONS ARE TAKEN BEFORE LOOSENING ANY BOLTS OR MOVING THE SPRINGS.

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Figure 2-4. Overhead Door Counterbalance (Featuring Springs).

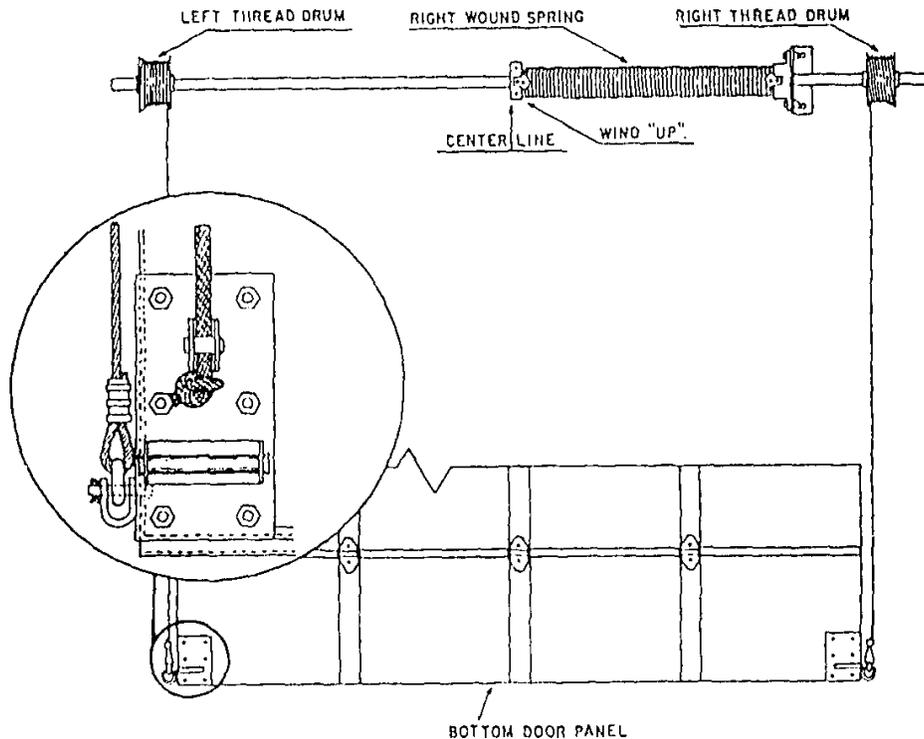
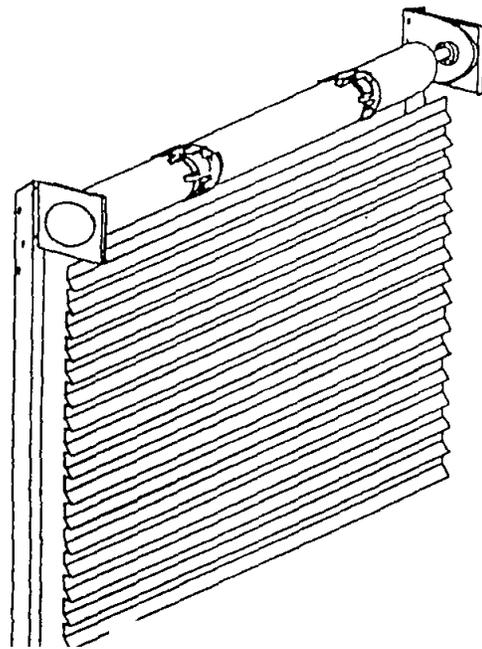


Figure 2-5. Rollup Door.

3. Rollup Doors.

3.1. Most of what you inspected with the overhead doors will also be utilized for rollup doors with some minor differences. Rollup doors have a curtain of metal slats that roll up around a tube or shaft as it is raised (See Figure 2-5). This tube contains torsion springs, much like those used for the overhead door, which counterbalance the door curtain weight. The metal slats making up this curtain come in various shapes depending on the manufacturer, but all are relatively small to allow the curtain to roll into a small cylinder when raised (see Figure 2-8). The curtain is attached to the shaft by several metal collars that bolt to the curtain, then wrap around the shaft and bolt to itself. Both ends of the slats are inserted in tracks mounted to the building. Normally there is a chain-operated gear reduction assembly used to turn the shaft that raises the door. There are many assembly variations—direct gear, power-driven and gear reduction to name a few (See Figure 2-6 on the next page).



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3.2. Procedures. Follow these steps to inspect rollup doors:

SAFETY:

IF DOOR LOOKS UNSAFE, STOP INSPECTIONS AND HAVE IT REPAIRED IMMEDIATELY.

Step 1: Conduct a visual inspection.

- 1.1. Look to see that the door is sitting in the opening squarely and evenly.
- 1.2. If the door appears to be at a slight angle, it could be as simple as one or more of the collars attaching the curtain to the shaft has slipped, or as complex as the spring within the tube has broken. Make note of any discrepancies and repair immediately.

Figure 2-6. Typical Gear Driven Mechanism.

Step 2: Check gear and sprocket alignment.

- 2.1. Lay a straight edge across the face of both gears and sprockets to check the alignment (See Figures 2-6 and 2-7).
- 2.2. The straight edge must fully touch the face on both gears.
 - 2.2.1. If they do not touch, loosen the setscrew and realign the gear.
 - 2.2.2. Make certain the setscrew is tightened securely after the gear is properly aligned.

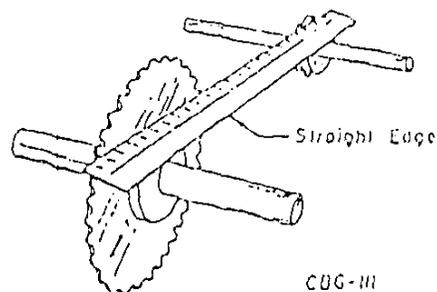


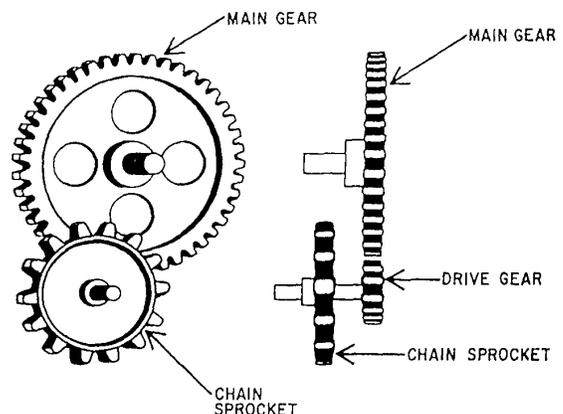
Figure 2-7. Sprocket Alignment.

Step 3: Inspect all door/mechanism hardware.

- 3.1. Ensure all nuts, bolts and setscrews are in place and securely fastened.
- 3.2. Lubricate with paraffin wax or silicon spray. This type of lubrication prevents attracting dust and dirt.

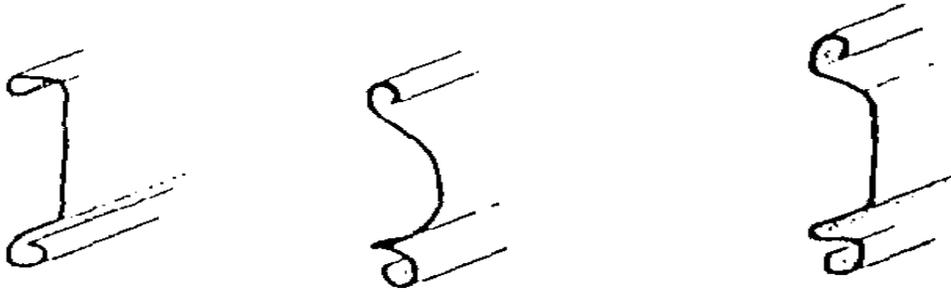
Step 4: Perform an operations check.

- 4.1. Operate the door up and down two or three times, watching its operation. Observe how smoothly it rolls up and down. If there is anything wrong with the door, it will be evident through this step.
- 4.2. If the motion is jerky, the track may need to be lubricated (refer to the lubrication suggested in step 3).
- 4.3. If the door hangs up or binds on one side when coming down, there could be a damaged slat or the tension on the springs may need to be adjusted.



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Figure 2-8. Door Slat Shapes for Typical Rollup Doors Only.



NOTE:

The above pictures are some of the different slat styles used on rollup doors.

**REVIEW QUESTIONS
FOR
INSPECT METAL DOORS**

QUESTION	ANSWER
1. The excessive weight of overhead and rollup doors is counterbalanced by the use of torsion springs.	a. True. b. False.
2. Overhead doors are hinged on the panels vertically.	a. True. b. False.
3. If there is any damage to a hinge, _____.	a. lubricate them. b. replace all the hinges. c. replace the damaged hinge only. d. perform necessary repairs to the panel.
4. The track is bolted or welded to the _____ or jamb.	a. wall b. floor c. header d. panels
5. A closer inspection of the _____ should be made to ensure there aren't any flattened out areas, allowing the roller to come out of the track.	a. track b. hinges c. rollers d. ball bearings
6. _____ wax can be used in the track, and very small amounts silicon spray can be placed in the rollers to prevent rust and corrosion.	a. Car b. Floor c. Canola d. Paraffin
7. If an overhead door is hard to lift, there is not enough tension on the springs.	a. True. b. False.
8. A straight edge should be used when checking curtain alignment on rollup doors.	a. True. b. False.
9. When performing an operations check on a rollup door, if it hangs up on one side, chances are that _____.	a. the cable has slipped. b. a door slat is damaged. c. the track has been greased. d. the door track has pulled loose.
10. It is always advisable to refer to the manufacturers manual for proper inspections and repairs on rollup doors.	a. True. b. False.

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INSPECT METAL DOORS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

DID THE TRAINEE....	YES	NO
1. stop the inspection if the door was unsafe?		
2. perform inspection on overhead doors successfully?		
3. perform inspection on rollup doors successfully?		
4. comply with all safety requirements?		

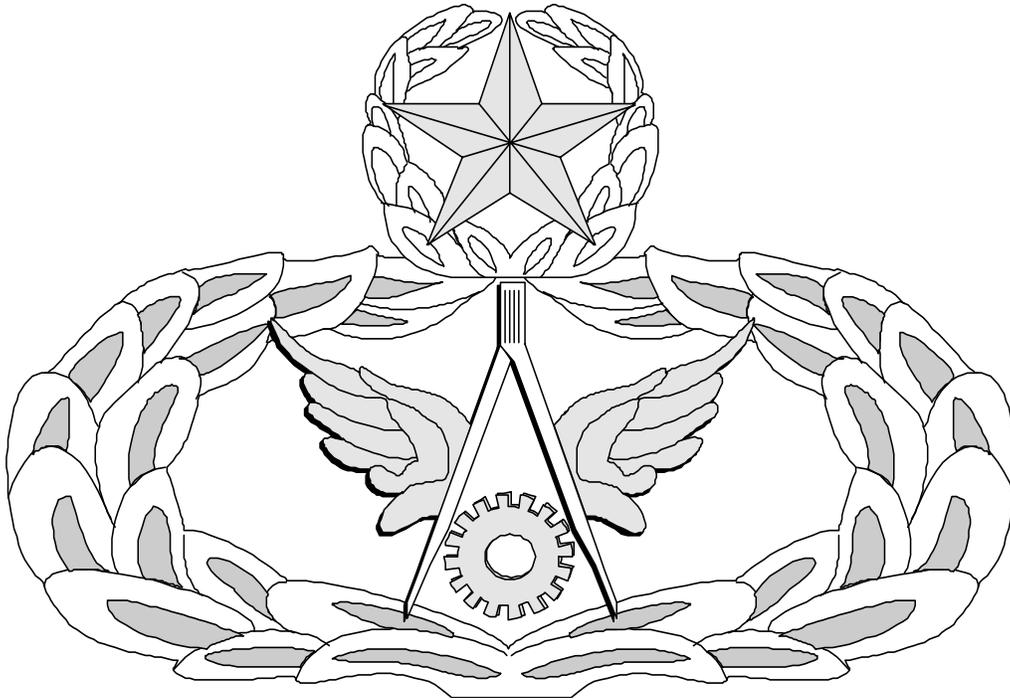
FEEDBACK: Trainer/Certifier should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer/certifier.

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Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



FOR
STRUCTURAL
(3E3X1)

MODULE 30

VEHICLE AND EQUIPMENT FACILITY DOORS

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Key-1

**INSPECT METAL DOORS
(3E3X1-30.1.)**

QUESTION	ANSWER
1. The excessive weight of overhead and rollup doors is counterbalanced by the use of torsion springs.	a. True.
2. Overhead doors are hinged on the panels vertically.	b. False.
3. If there is any damage to a hinge, _____.	b. replace the damaged hinge only.
4. The track is bolted or welded to the _____ or jamb.	a. wall
5. A closer inspection of the _____ should be made to ensure there aren't any flattened out areas, allowing the roller to come out of the track.	a. track
6. _____ wax can be used in the track, and very small amounts of silicon spray can be placed in the rollers to prevent rust and corrosion.	d. Paraffin
7. If an overhead door is hard to lift, there is not enough tension on the springs.	a. True.
8. A straight edge should be used when checking curtain alignment on rollup doors.	b. False.
9. When performing an operations check on a rollup door, if the curtain hangs up on one side, chances are that _____.	b. a door slat is damaged.
10. It is always advisable to refer to the manufacturers manual for proper inspections and repairs on rollup doors.	a. True.

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MEMORANDUM FOR HQ AFCESA/CEOF
139 Barnes Drive Suite 1
Tyndall AFB, FL 32403-5319

FROM:

SUBJECT: Qualification Training Package Improvement

1. Identify module.

Module # and title _____

2. Identify improvement/correction section(s):

<input type="checkbox"/> STS Task Reference	<input type="checkbox"/> Performance Checklist
<input type="checkbox"/> Training Reference	<input type="checkbox"/> Feedback
<input type="checkbox"/> Evaluation Instructions	<input type="checkbox"/> Format
<input type="checkbox"/> Performance Resources	<input type="checkbox"/> Other
<input type="checkbox"/> Steps in Task Performance	

3. Recommended changes--use a continuation sheet if necessary.

4. You may choose to call in your recommendations to DSN 523-6445 or FAX DSN/Commercial 523-6488 or (850) 283-6488 or email ceof.helpdesk@tyndall.af.mil.

5. Thank you for your time and interest.

YOUR NAME, RANK, USAF
Title/Position