General Running Procedure

Procedure No: FT-RP-000

Rev: 04

Approvals

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Revision Control

REV	Description of Changes	Date Issued
00	Issued for use	11/03/2020
01	Understanding make-up graphs, accessories	02/26/2021
02	Clarification Edits	11/01/2024
03	Add Storage, Transportation and Handling	2/14/2025
04	Section 2, 6, 7 & 8 revised to specify preparation and equipment guidelines	6/23/2025

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1. Definitions

1.1. **Constrictor® Thread Form Connections**

1.1.1. Constrictor® Thread Form is a Wedge Thread Form, also called out as a Locking Thread Form.

1.1.2. Connections using this thread form are Bushmaster®, Anaconda™, Cobra® and King Cobra®.

2. Inspector and Certification Requirements

2.1. **Qualified Inspector:**

2.1.1. A Qualified Inspector is a Field Service Technician or Quality Representative that is certified by Fermata®.

2.1.2. Only a Qualified Inspector may inspect and repair Fermata® connections.

2.2. **A Certified Field Service Technician:**

2.2.1. Has successfully completed Fermata® Field Service Training.

2.2.2. Holds a valid Fermata® Field Service Technician Certificate.

2.3. **A Certified Quality Representative:**

2.3.1. Is employed by Fermata® or a Fermata® Licensee.

2.3.2. Has successfully completed Fermata® gauge training.

2.4. **Field Service Technician Expectations while running Fermata® Connections**

2.4.1. The Field Service Technician must ensure that he has the correct and latest data sheets.

2.4.2. The Field Service Technician will apply all thread compound per the manufacturers' recommendations prior to starting the casing run. If any joints are not able to have thread compound applied on the pipe rack due to the way the pipe is arranged, the Field Service Technician will apply the thread compound as they are brought to the rig floor or as the ends are accessible on the pipe rack during the run.

2.4.3. The Field Service Technician must remain on the tower or rig floor to accept all make-up graphs and notify the rig crew that he will be on the ground applying thread compound on the pipe rack.

2.4.4. During the running of the casing, the Field Service Technician is responsible for approving all make-up graphs and verifying the placement of the Constrictor® lock point. If the movement of cables, slips, or binding of elevators is observed, all efforts must be made to fix the issue and shall be noted in the comments of the make-up graph and the field service report.

3. Storage

3.1. **Storage Compound**

3.1.1. Storage compound shall be applied to all machined surfaces, this process should be completed during the manufacturing process before installation of the thread protector.

3.1.2. Kendex is the recommended storage compound, unless otherwise specified by the Customer.

3.2. **Pipe Yard Storage Requirements**

3.2.1. CRA and high Chromium (≥13%Cr) material may require separate storage areas from other pipe to reduce risk of corrosion. Storage areas should be covered to keep pipe dry and use non-metallic materials to move and store product.

3.2.2. All field end connections shall have thread protectors with storage compound.

3.2.3. Pipe shall not be stacked directly on the ground.

3.2.4. Supports or wooden strips shall be used between layers so that no pipe is resting on top of each other and to prevent couplings from resting on each other.

3.3. **Rig Site Storage Requirements**

3.3.1. It is recommended to coordinate delivery of the pipe as close to the run date as possible to prevent pipe from sitting for an extended time at the rig site.

3.3.2. Pipe shall not be stacked directly on the ground.

3.3.3. Supports or wooden strips shall be used between layers so that no pipe is resting on top of each other and to prevent couplings from resting on each other.

3.3.4. Clean threads and thread protectors to remove storage compound in a timely manner so that it shall not sit unprotected for more than 24-48 hours

3.3.5. If pipe is not used in a timely manner, two options of corrosion prevention methods are:

- Apply light coat of OCR 130 or WD40, and clean with a pressure washer prior to running to remove any accumulated dirt or debris.
- Reapplication of storage compound and thread protectors - requires another cleaning prior to running. Recommended if extended delay is expected.

3.4. **Thread Protector Requirements**.

3.4.1. Thread protectors shall be always installed with a snug fit.

3.4.2. Any damaged thread protectors shall be investigated for damaged connections.

3.4.3. Verify that the protector, connection, size and weight (if applicable) match the product.

3.4.4. Approved protectors are Fermata® Red with a Fermata® Logo.

- For Rattler® an industry standard protector can be used ensuring proper fit.

4. Transportation

4.1. Truck and Ground Transportation – additional considerations to customer or local transportation requirements.

4.1.1. Pipe should be loaded and stacked so that it is separated, no pipe or coupling should be resting on each other.

4.1.2. CRA and high Chromium material may require separate transportation or segregation from other materials.

4.1.3. Thread Protectors shall always be installed during handling and transportation.

4.1.4. Load the product so that all couplings are on the same end of the truck.

4.1.5. After a short distance or drive time, it is recommended to re-tighten any straps or chains from the load settling.

5. Handling

5.1. Thread protectors shall always be installed tightly for any handling.

5.2. CRA and high Chromium material may require special handling – non-metallic materials such as nylon straps or plastic sling material.

5.3. When rolling pipe or unloading pipe by hand, keep the pipe parallel and do now allow the pipe to gain momentum or to strike.

6. Pipe Preparation

6.1. **Pre Job-Check**

6.1.1. Verify pipe size, weight, grade, connection type, and quantity.

6.1.2. The latest version of the connection data sheet must be requested from Fermata® prior from web-site@fermata-tech.com.

6.1.3. Remove thread protectors & packaging from pin and box end.

6.1.4. Clean and remove thread storage compound from box and pin end using a pressure washer/steam cleaning with water or a cleaning solvent, or cleaning solvent and rags.

6.1.5. Diesel/Gasoline based liquids to clean the threads or protectors are not acceptable, as they may interfere with the thread compound adhering or spreading on the threads.

6.1.6. Brushes with nylon or synthetic bristles may be used to clean the threads and protectors. Metal bristle brushes are not to be used.

6.1.7. Note that timing is important: Connections should not sit for an extended period of time without some form of corrosion prevention.

6.1.8. Perform visual inspection of pin and box connections (see procedure FT-FI-001 Fermata® Connections Field Visual Inspection and Repair Requirements latest revision).

6.1.9. Perform full length drift to check for obstructions (see Drift Requirements in Section 6.3).

6.1.10. Tally pipe.

6.1.11. If pipe is expected to sit for more than 48 hours, apply a water displacer and corrosion inhibitor such as OCR 130 or WD40. It is recommended to reapply daily in wet environments for up to 3 days. Remove any accumulated debris with pressurized air or a power washer prior to running.

6.1.12. If running is expected to be delayed for 7 days or longer after cleaning, reapply storage compound and thread protectors, this will require another cleaning prior to running to remove accumulated dirt and debris.

6.2. **Thread Protectors**

6.2.1. If the box/pin end has been cleaned and prepped to run, ensure the storage compound has also been cleaned and removed from the thread protector before installing again for transportation to rig floor.

6.2.2. Thread Protectors shall have a snug fit prior to transporting from storage to the rig floor; do not overtighten.

6.2.3. Box and pin protectors can be paired together and returned to Fermata®.

6.3. **Drift:**

6.3.1. All casing shall be drifted prior to running.

6.3.2. Compressed air may be used if available prior to drifting. Each joint must be blasted from box end to pin end.

6.3.3. Drift mandrels shall meet API dimensional requirements, and a special drift mandrel shall be used when applicable.

6.3.4. Drift from box end to pin end to ensure the mandrel does not damage the connection

6.3.5. Use a plastic or nylon drift mandrel on all internally coated (IPC) and CRA (Corrosion Resistant Alloy) pipe.

6.3.6. If any joints do not drift, the joints shall be clearly marked red and segregated from the remaining prime joints.

6.3.7. The drift mandrel should slide easily through the pipe, do not force it.

7. Running Tools

7.1. The running tools covered in this section are typically provided by a Fermata® Field Service Provider. However, it is critical to review and verify all necessary running tools.

7.2. **Crossover Subs**:

7.2.1. Crossovers from a Fermata® connection to an API connection are used for well control and cementing. The pin and box ends shall be inspected prior to each use and verified compatibility with the connection and configuration (size/weight).

7.3. **Handling Plugs:**

7.3.1. Handling plugs shall be inspected prior to use. Only authorized handling plugs that are manufactured by OFSI or approved Fermata Licensees shall be used.

7.3.2. Handling plugs are required when running integral connections and recommended in threaded & coupled connections to protect the box.

7.3.3. Handling plugs are not lift plugs and shall not be used to support the weight of the string.

7.3.4. Handling plugs shall not support the weight of more than 3 joints, or a combined total of 10,000 lbs. for large diameter configurations.

7.3.5. Handling plugs are required for threaded & coupled connections if tools will be run inside the coupling during make-up.

7.3.6. Clean and inspect handling plugs prior to each casing run.

7.3.7. Always keep handling plugs and box connections free of debris.

7.4. **Stabbing Guides:**

7.4.1. Fermata® recommends the use of a stabbing guide to prevent cross-threading and damage during stabbing.

7.5. **Thread Protectors:**

7.5.1. Install thread protectors prior to any movement of the pipe.

7.5.2. Verify the correct thread protectors are being used.

7.5.3. Do not remove the pin connection thread protector until the joint is ready to stab to prevent damage from accidental mishandling.

7.5.4. Quick release thread protectors may be used if they do not fall off.

7.6. **Low Torque Valves (LTV):**

7.6.1. All LTV's have a 2 inch by 1502 connection on top and bottom. The valves are rated for 10,000 PSI. All valves shall have the following inspected before and after use:

- Check all seal rings for tears or damage.
- Look for any damage to the valve body.
- Make sure the valve opens and closes, then leave in the open position.

7.7. **Circulating Swage:**

7.7.1. The circulating swage is designed to circulate drilling fluid. The following should be checked on all circulating swages before and after use.

- The ID/OD for damage.
- Check for burrs, dent, tears, and rust and out of roundness on the LC or BC side.
- Check all seal rings for tears or damage.

8. Equipment

8.1. Equipment in this section is not typically provided by Fermata® Field Service Provider. It is critical to ensure that all necessary equipment is available and ready prior to the casing run. If there is any question about compatibility of equipment with Fermata® Connections, please contact a Fermata® Field Service Provider.

8.2. **Elevators:**

8.2.1. **Single Joint Elevators:**

- Verify the correct size single joint elevator is being used.
- Single joint elevators shall only lift one joint.

8.2.2. **Slip Type Elevators:**

- **Slip Type Elevators MUST** be used on all integral joint connections and special clearance threaded & coupled connections.
- **Slip Type Elevator Spacers:** There **MUST** be a spacer to ensure the dies do not bite down on the box on integral joint connections or the coupling for special clearance threaded & coupled connections.

8.2.3. **Collar Type Elevators:**

- May be used on threaded & coupled connections, and lift on the engaged coupling face cross-sectional area. Applicable to standard and special clearance applications.
- It's critical that the elevators are the correct size. Having the wrong size can cause loss of life and/or dropping the string.

8.2.4. **Bottleneck Elevators (Drill Pipe):**

- **Bottleneck elevators (Drill Pipe) shall not be used with any Fermata® connections.** Bottleneck elevators are designed to work with rotary shoulder drill pipe connections – not casing connections.

8.3. **Casing Running Tool (CRT):**

8.3.1. Fermata® does not recommend make-up with a CRT. However, if an operator chooses to make-up with a CRT, the recommendations are as follows:

- Care must be taken to ensure that the torque indicators and over-torque dump valves are accurate.
- If a CRT is used to make-up the connection, a dump test and calibration must be completed with the Top Drive and the torque sub.
- When the connection is stabbed, the CRT should be rotated counter clocker wise 1/2 of a turn to ensure the connection is not crossed threaded.
- Ensure that the gripping segments (external/internal) are properly set away from the connection to prevent damage.
- If using an automated drill rig, a reference torque can be set to the top drive. This will slow down the CRT when the make-up torque hits the reference number. Set the low shoulder torque number as the reference number, this will help prevent the top drive from dumping late and over-torquing the connection.

8.4. **Tongs:**

8.4.1. **Power Tongs**

- Power tongs shall be calibrated at least semiannually, be within the required torque range of the pipe size being run and shall have the correct size jaws properly installed to prevent damage to the pipe.
- Back up tong grip pressure should be as low as possible, and the gripping area should be as large as possible prevent damage to the casing.
- All dies on tongs need to be checked and any dies that have build up on them need to be cleaned and or replaced if they are heavily worn and will not grip the pipe properly.
- The turns counter must be calibrated with the gears in the tongs prior to running casing.
- The dump valve must be tested prior to running casing to ensure it is working properly (dead stick test).

8.4.2. **Integral Casing Tongs (Recommended)**

- Integrated back-up tongs are recommended for all sizes. A compression load cell must be used with integral tongs; see the torque turn section for more details.
- When using tongs with integrated back-up, the back-up must be free to travel to compensate for make-up loss and misalignment within the system (rig alignment, pipe geometry, alignment of the tong jaws).

8.4.3. **Conventional Casing Tongs (Acceptable if Integral Tongs are not available)**

- Back-up tongs are recommended for the first 50 joints or until there is adequate string weight to prevent the string from rotating.
- Snub lines shall be at 90° to the tong arm and horizontal to ensure accurate torque readings and prevent misalignment during the make-up process.
- The power tongs shall be perpendicular to the casing. A level should be used to ensure that the power tongs, back up tongs, and the snub line are horizontal.
- Power tongs must be rigged in a way that the weight of the tongs does not result in bending, misalignment of the pipe during make-up, or damage critical seal and/or thread areas. Snub line securement points for the power tongs and back-up tongs should be checked if bending or misalignment is observed during make-up.
- The tong must have the ability to lower gradually as the threads are made-up to compensate for the make-up loss and prevent bending or misalignment during make-up.

8.5. **Torque Turn:**

8.5.1. Torque turn monitoring is required for assessing a proper make-up of Fermata® connections.

8.5.2. System must have torque vs turns. Torque vs time can also be used with torque vs turns however all graphs MUST have at a minimum have Torque vs turns displayed on the graph.

8.5.3. The graph must show the full make-up.

8.5.4. A torque shoulder must be visible (except for Constrictor® Thread Form connections, ref. Section 1.1).

8.5.5. The torque shoulder must be properly marked in the graph for proper calculation of delta turn and delta torque.

8.5.6. Fermata recommends setting the scale (X axis) of the make-up graph between 5-10 turns to obtain a proper connection make-up profile. The scale of the make-up graph is important because, it can change or distort the appearance of the make-up profile and may result in misinterpretation of make-up. The scale of the graph is determined by the total torque and total turns in the make-up graph. Refer to the connection specific running procedure for recommendations of what parameters to use for scaling the graph.

8.5.7. The operator must confirm the correct placement of the torque shoulder marking, if the torque-turn system uses automatic shoulder detection.

8.5.8. In case of a re-run, each joint shall be labeled with the same tally number as the previous make-up attempt following by a hyphen or a period and the make-up attempt number to indicate that it is subsequent makeup of the same joint. EXAMPLE: 105.1 or 105-1 is the first re-run of joint 105.

8.5.9. Only competent personnel such as Field Service Technicians certified by Fermata® can approve torque turn graphs.

8.5.10. The unit should be capable of a minimum pulse rate of 500 samples per turn, with up-to-date calibration.

8.5.11. Improper equipment can result in poor make-up graphs and damage to the connection. See Figure 1.

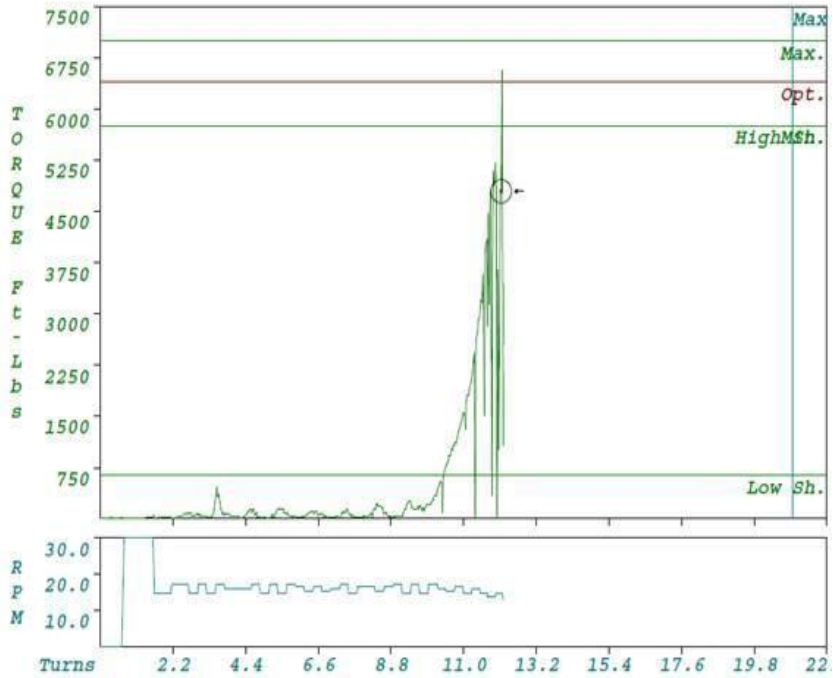

Figure 1: Example of a Bad Graph Due to Improper Equipment

8.6. **Calibration:**

8.6.1. Minimum of once annually.

- This applies for primary and secondary systems used on site.

8.7. **Additional Torque Turn Parameters:**

8.7.1. Display Requirements

- Use the minimum number of turns required to observe the full make-up profile. Too many turns displayed on the X axis of the make-up graph will result in a compressed graph which is difficult or impossible to interpret make-up issues.
- MIN, OPT and MAX torque display
- Numerical display of Final Torque, Shoulder Torque (when applicable) and Delta Turns.

9. Understanding Make-up Graphs

9.1. Graph Example for a Shouldered Connection:

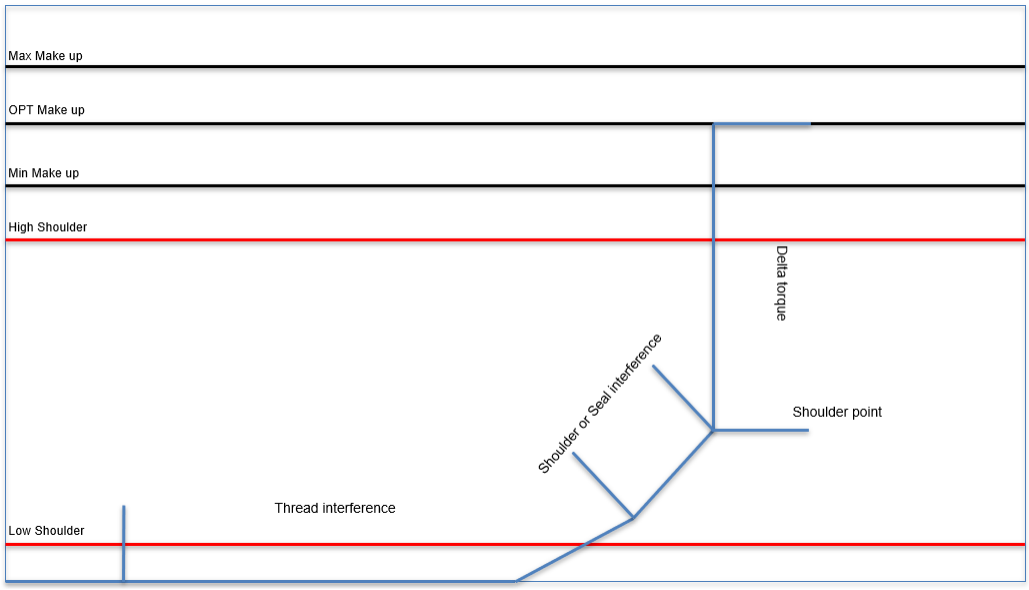

Figure 2: Graph Detail

9.1.1. Thread Interference is the portion of the graph which torque is generated by the interference fit of the pin and box threads.

9.1.2. Seal Interference is the portion of the graph which torque is generated by the interference fit of the pin and box seals. This only applies to shouldered connections with metal-to-metal seals.

9.1.3. Shoulder point is the point at which the pin and box shoulder surfaces make contact. This is followed by a spike in torque in the make-up graph.

9.1.4. Delta torque is the torque beyond the shoulder point. It is calculated as final torque – shoulder torque.

9.1.5. Delta turns are the turns beyond the shoulder point. It is calculated shoulder final turns – shoulder turns.

9.1.6. Dump torque is a parameter to set within a torque-turn system. It is the torque at which the dump valve engages automatically to shut-off make-up. It should be set somewhere between minimum and maximum make-up torque. Typically, it is set as the optimum make-up torque specified on the connection data sheet.

9.1.7. Final torque is the torque at which the make-up stops.

9.2. **Graph Example for Constrictor® (Wedge) Connection:**

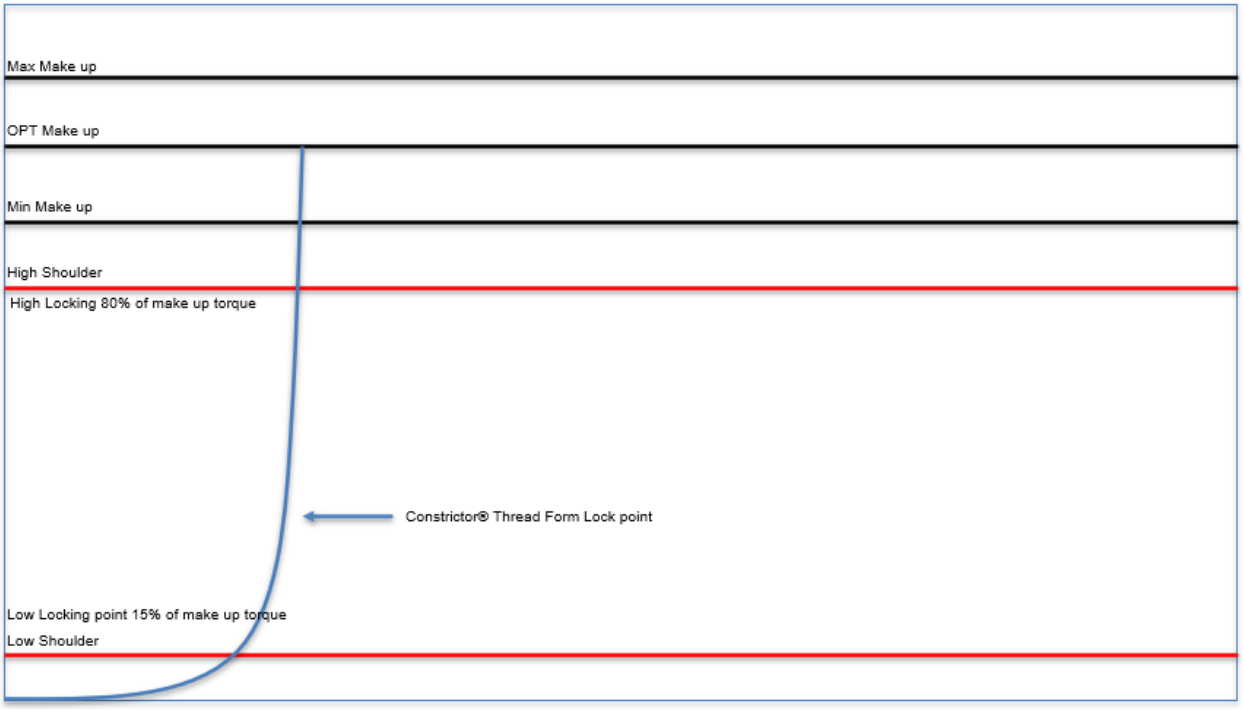

Figure 3: Constrictor® Thread Form Graph Detail

9.2.1. Connections with the Constrictor® Wedge Thread form will have a lock point instead of a shoulder point.

9.3. **Acceptable Graph Examples:**

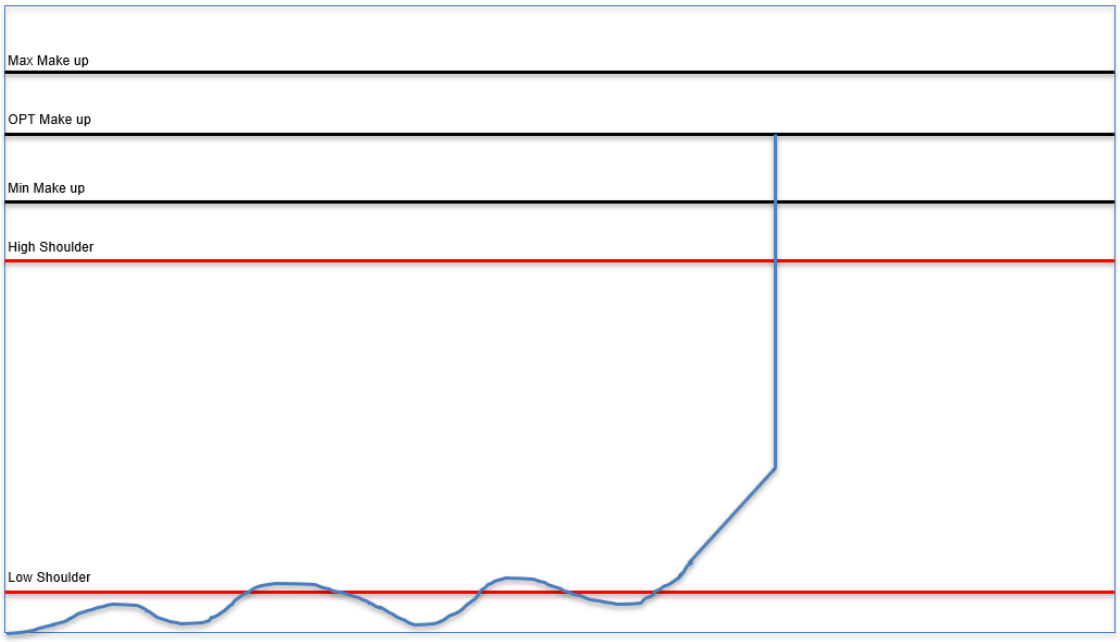

Figure 4: Example of an Acceptable Make-Up Graph with a Wave

Make-up graph with a wave:

Possible causes:

- Too much thread compound
- Movement within the tongs or other equipment contacting the pipe.
- Oversized make-up equipment

Solutions:

- The graph shows the joint has an acceptable shoulder and reached optimal torque. This is an acceptable make-up.
- Check thread compound application
- Check for movement in the make-up equipment including attachment between the load cell and the tongs.

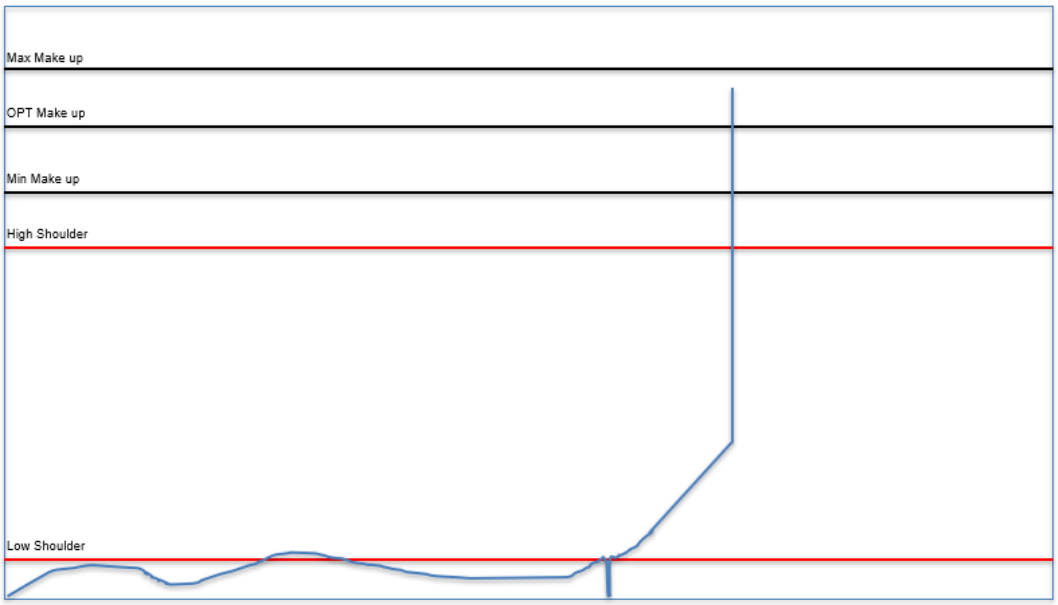

Figure 5: Example of an Acceptable Make-Up Graph with a Slip

Make-up graph with a slip:

Possible causes:

- The back-up tongs moved
- The slips moved
- Late shift by tong operator

Solutions:

- The graph shows the joint has an acceptable shoulder and reached optimal torque. This is an acceptable make-up.
- Additional string weight may fix this issue
- Guide the tong operator to shift earlier

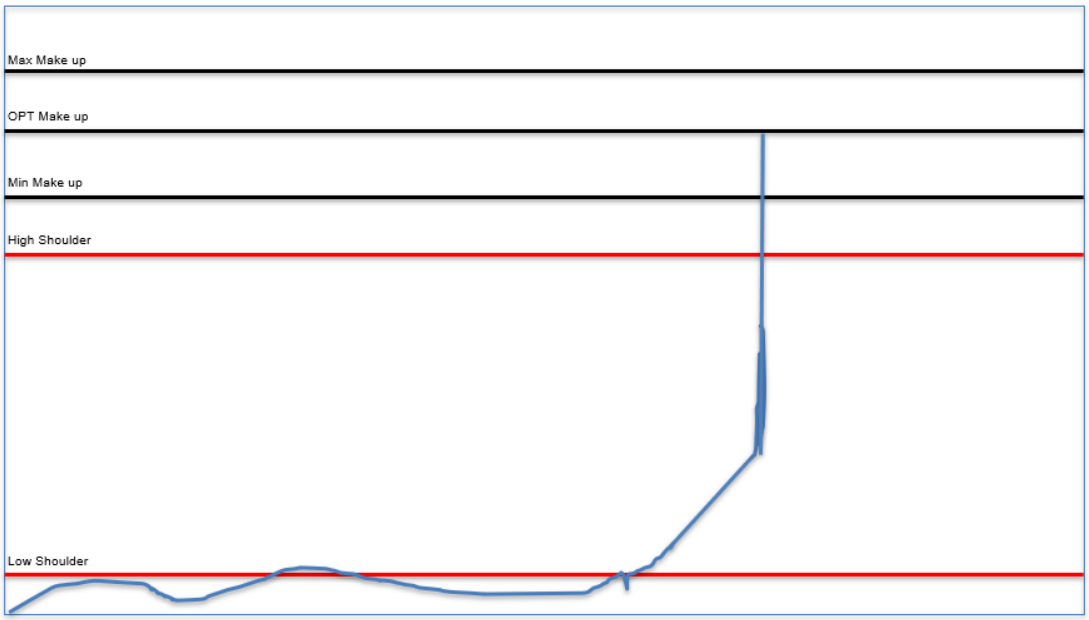

Figure 6: Example of an Acceptable Make-Up Graph with a Slip after the Shoulder Point

Make-up with a slip after the shoulder point:

Possible causes:

- The back-up tongs moved
- The slips moved
- The power tong dies slipped

Solutions:

- The graph shows the joint has an acceptable shoulder and reached optimal torque. This is an acceptable make-up.
- String weight may fix this issue
- Ensure the slips are chained down properly if not using hand slips.
- Ensure the back-up tong dies are clean and are biting properly.
- Ensure the power tong dies are clean and biting properly.

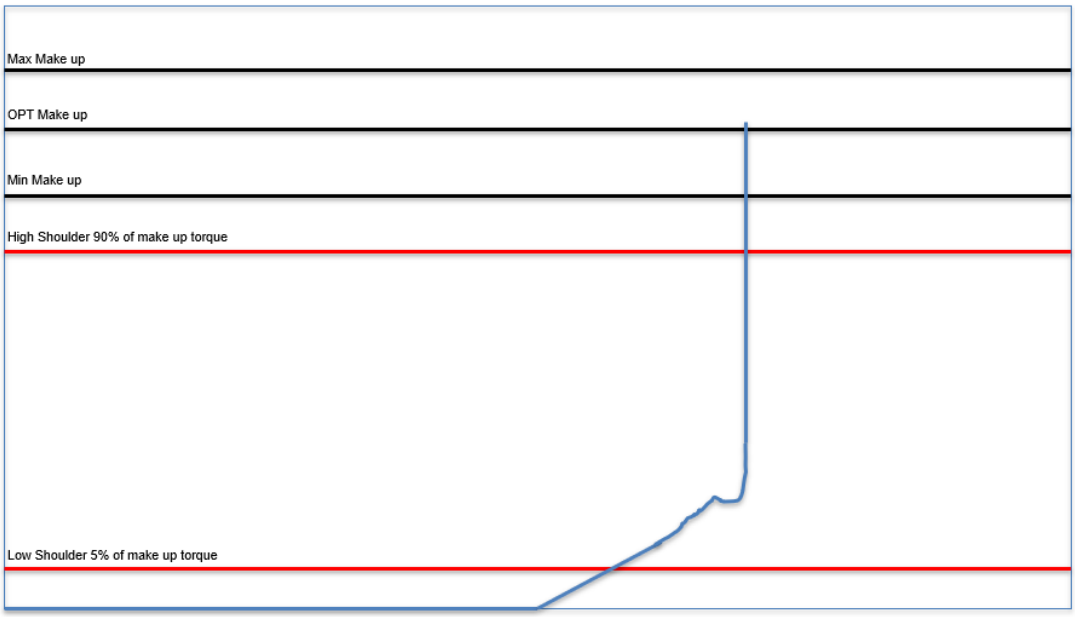

Figure 7: Example of an Acceptable Make-Up Graph with Dope Squeeze or a Turning Coupling

Make-up with dope squeeze or a turning coupling:

Possible causes:

- Coupling turned
- Dope squeeze
- Drilling fluid overflowed

Solutions:

- Check the doping of the connection and ensure there is no thread compound in the seal or dope relief groove.
- Verify the rig has good vertical alignment.
- If a coupling turns on the next make-up, stop and bite the back-up tongs on the mill side of the coupling and complete the make-up.
- If it has a clear shoulder, hit optimal torque, has no sign of yielding, and the coupling turned less than ¼ of a turn, then this is an acceptable make-up.

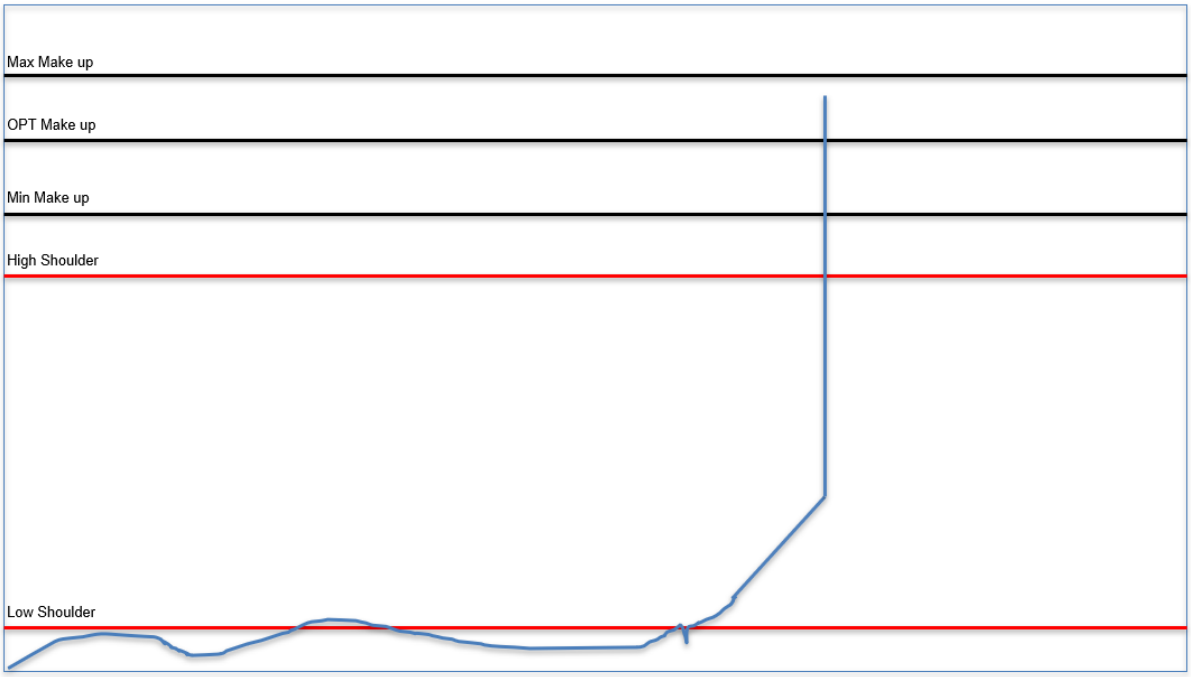

Figure 8: Example of an Acceptable Make-Up Graph with a Late Torque Dump

Make-up with a late dump:

Possible causes

- High rpm in low gear or rpm not steady
- The power unit may be revved up too high
- If the torques are too close together the unit could dump late.

Solutions:

- If the torque is close, lower the dump torque by a few hundred ft-lbs to get it to dump at optimum torque. Ensure the torque is not lowered too much and that the make-up still dumps above minimum torque.
- Turn down the power unit
- This is an acceptable make-up if the final torque was lower than max operating torque and there is no indication of yielding.

9.4. **Unacceptable Graph Examples:**

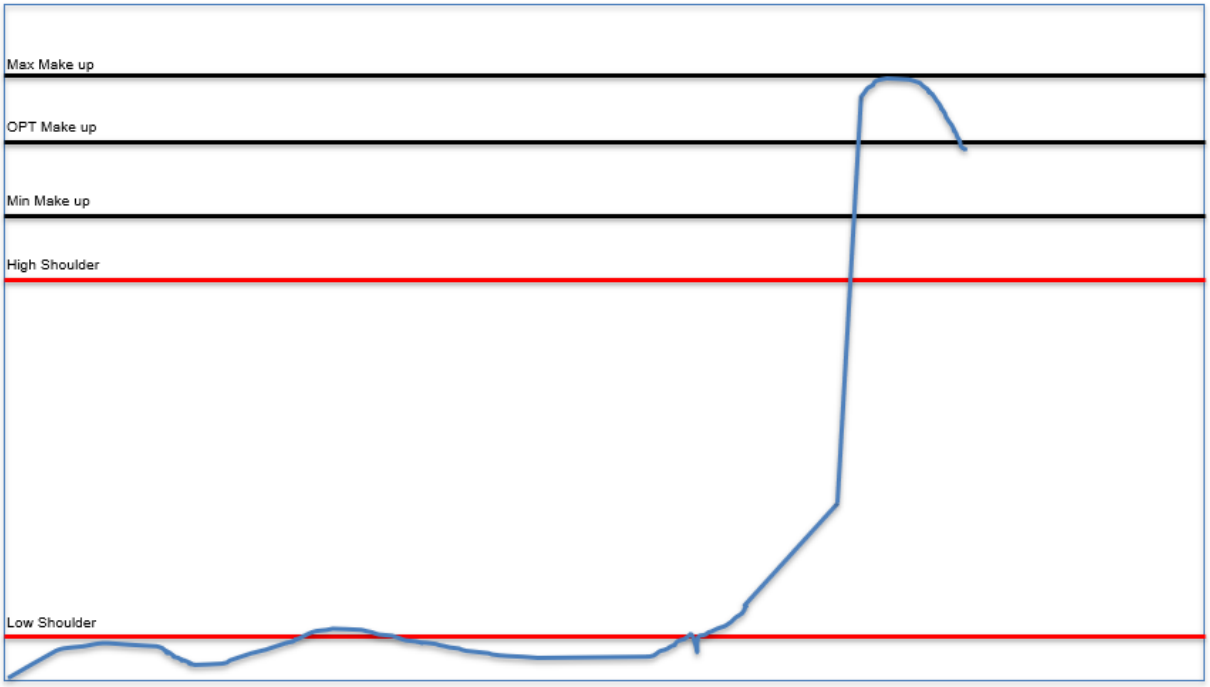

Figure 9: Example of an Unacceptable Make-Up with a Low Shoulder and Yielding

Make-up with a low shoulder and yielding

Possible causes:

- Seal damage
- Thread damage
- Over torqued
- Appling thread compound improperly
- Excessive misalignment during make-up
- Torque-turn equipment reading improperly

Solutions:

- Inspect seal for damage
- Check thread compound application and type.
- Back joint out and lay down pin and box

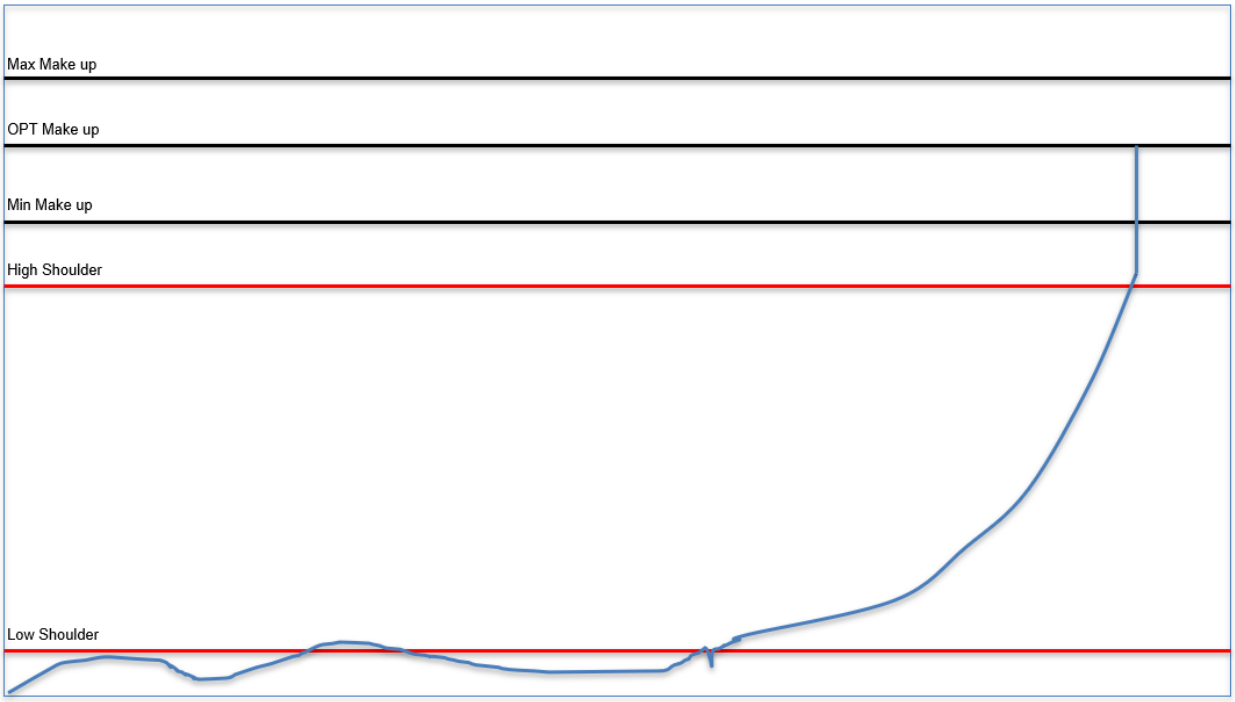

Figure 10: Example of an Unacceptable Make-Up with a High Shoulder

Make-up with a high shoulder

Possible causes:

- Dirty threads
- Vertical alignment
- Thread damage
- Improper thread compound application
- Running thread lock with a factor of 1.51 without adding 5% torque.

Solutions:

- Backout, clean and inspect the threads. If the threads are acceptable, re-make the connection.

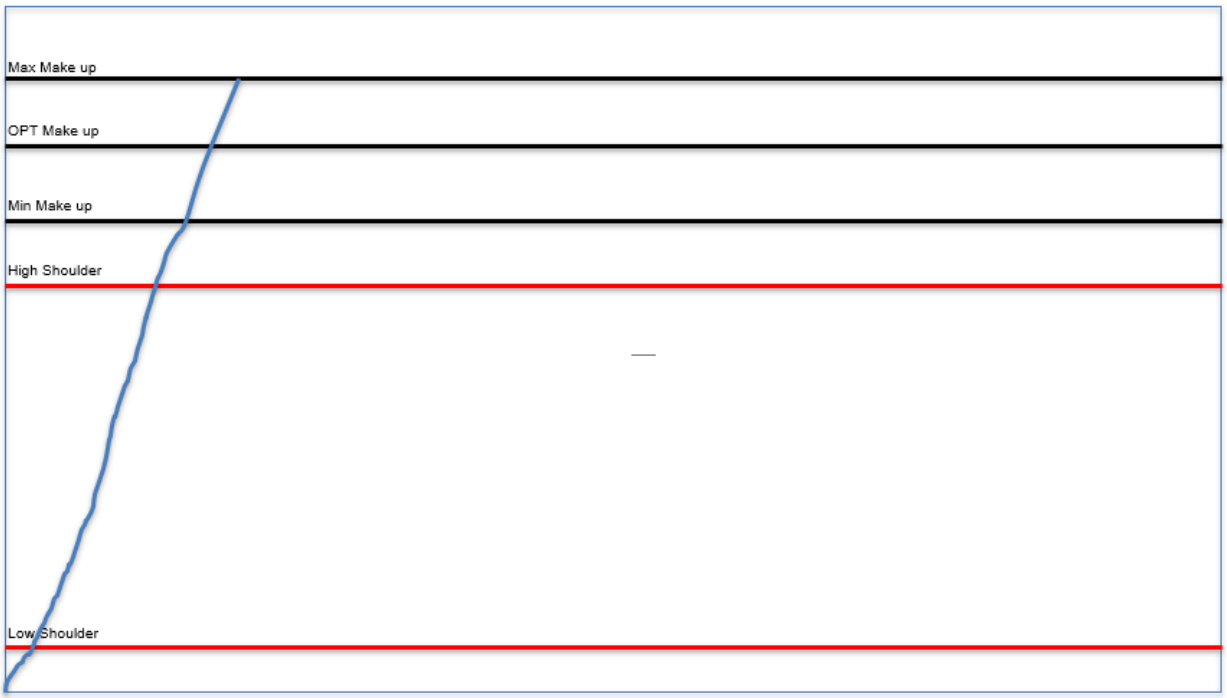

Figure 11: Example of an Unacceptable Make-Up with Cross-Threading

Make-up with cross-threading

Possible causes:

- Bad stab
- Bad vertical alignment
- Driller stacking out on the joint
- When using a CRT to make connections, the driller may have failed to turn the joint counterclockwise.

Solutions:

- Back out the joint, clean, inspect, and repair if needed. If the joint is acceptable, apply thread compound and re-make. If the joints are unacceptable, lay them down. Note: if you see this happening, try to stop the make-up as soon as possible to potentially save the joints.
- Ensure the driller turns the joint counterclockwise before making up the joint.

10 Job Safety Analysis

10.1 A JSA is a tool used to identify and reduce the risk associated with a task. A JSA and a pre-run meeting will be conducted before any casing is run. Below are points that need to be covered in a pre-run meeting. After the meeting follow up with the tong operator and the torque operator to see if they have any questions.

- A stabbing guide **shall be** used with every connection make-up.
- If running a threaded and coupled connection, a handling plug shall be used any time a CRT or fill up tool is used. If running an integral connection, a handling plug **shall be used at all times.** The handling plug shall be made up hand tight and bumped tight with a bar. Never use a hammer to hit the bar as this will cause damage to the handling plug and the connection.
- Thread protectors will be used any time casing is being moved, including being brought up to the V door.
- Watch for pinch points and never put your hand under a joint of casing hanging in the derrick.
- If a stab is missed, do not try to knock the joint in. Have the driller lift the joint and attempt to re-stab. Knocking the connection in can cause damage to the connection.
- If the connection looks cross threaded before make-up, turn counterclockwise until the thread hops and fully engages.
- Never put a dirty thread protector on a connection. Clean it before installing.
- If anyone sees a damaged thread, notify the lead-thread rep on location immediately.
- Review the max RPMs in high and low gear and the turns at which the casing crew should shift to low gear **(See connection specific running sections for RPM's and turns)**.
- Review rotating limits **(See connection specific running sections for rotating limit)**.
- If the couplings are spinning on pin-to-pin connections, instruct the casing crew to stop and bite the back-up tongs on the mill side of the coupling if it begins to turn.
- Ensure that the elevators are not engaged during make-up.