1. Scope

This General Running Procedure establishes standardized practices, requirements, and guidance applicable to the handling, preparation, running, make-up, rotation, break-out, inspection, and laydown of Fermata® Connections.

This procedure shall be used in conjunction with the applicable connection-specific running procedure and the latest revision of the Connection Data Sheet (CDS). Where conflicts exist, the connection-specific running procedure and CDS shall govern.

1.1. Approvals

Created	Angela Hill – Product Engineer	5/27/2026
Reviewed	Israel Martinez – Quality Director	6/02/2026
Approved	Wesley Ott – Director of Engineering	6/02/2026

1.2. Contents

2. Handling

2.1. Protection

All connections shall be handled in a manner that preserves the dimensional integrity, surface condition, and cleanliness of threads, seals, shoulders, and any torque-transfer features. Damage incurred during handling is a primary cause of field make-up issues and loss of connection performance.

Connections shall never be rolled directly on the ground, dragged, dropped, or allowed to impact hard surfaces. Any contact that may deform threads, mar sealing surfaces, or embed debris into the thread form shall be avoided.

2.1.1. Storage Compound

When connections are not being immediately run, a corrosion-inhibiting storage compound shall be applied to all threaded surfaces. The compound shall:

- Be compatible with the connection material and any subsequently applied running compound
- Be clean, homogeneous, and free of debris, water, or foreign matter
- Provide full coverage of threads and sealing areas

Prior to running, storage compound shall be completely removed from the connection and replaced with the approved running compound. See Section 4.2.2 for cleaning requirements.

2.1.2. Thread Protectors

Thread protectors shall be installed immediately after manufacturing, inspection, transportation, or break-out operations. They shall be used any time casing is being moved, including being brought up to the V door. Protectors shall:

- Be the correct size and thread form
- Fully engage without cross-threading
- Be clean, dry, and free of embedded debris

Damaged, loose-fitting, or contaminated protectors shall not be used.

2.1.3. Spacers

When pipe is stacked or bundled, spacers shall be used to prevent metal-to-metal contact between pin and box ends. Spacers shall maintain separation during transportation and storage to avoid impact damage.

2.2. Transportation

2.2.1. Trucking

During transportation, joints shall be properly secured to prevent shifting, vibration, or impact. Dunnage shall support the pipe body and prevent loading through the connections. Tie-downs shall not contact threaded areas or seals.

2.2.2. Forklifting

Forklifts shall only engage the pipe body and never contact pin or box ends. Care shall be taken to avoid bending, point loading, or sudden impacts.

2.3. Storage

2.3.1. Pipe Yard

Pipe yard storage shall provide adequate support, drainage, and access. Connections shall be elevated above standing water and protected from excessive dirt, moisture, and corrosion. Long-term storage (>3 months) shall include periodic inspection (every 6 months) of thread protectors and storage compound condition.

- For long-term storage, apply an approved storage compound (e.g., Kendex or equivalent) and ensure thread protectors remain installed and in good condition.
- Do not store tubulars directly on the ground. Use racks/dunnage that support the pipe body and prevent loading through the connections.
- Do not stack pipes such that couplings rest on couplings or connection ends contact each other.

CRA (e.g., ≥13%Cr) and internally coated pipe may require dry, covered storage and non-metallic handling materials where practical to prevent surface damage and corrosion.

2.3.1.1. Periodic Inspection Items

See Appendix B for Inspection Form

1) Thread Protectors
    - Presence: protectors installed on both ends (as applicable).
    - Fit/engagement: snug and fully engaged (not cross-threaded, not loose).
    - Condition: cracked, broken, deformed, missing threads, or worn to poor fit.
    - Cleanliness: not packed with dirt/sand; no standing water inside protector.
    - Seal/closure: if protector has sealing ring/plug, verify it's intact.
2) Storage compound condition
    - Coverage: visible, continuous film on accessible threaded/machined surfaces.
    - Degradation: dried out, washed off, separated, hardened, or contaminated with grit.

- Water intrusion evidence: milky appearance, emulsification, or water pooling.

3) Corrosion and surface condition (accessible areas)
   - Corrosion signs: rust staining, pitting, freckling, or underfilm corrosion at ends.
   - Mechanical damage evidence: dents/dings on end area, gouges, impact marks.
   - Handling damage indicators: crushed protectors, bent ends, scrape patterns.
4) Storage environment / stacking condition
   - Support: pipe is on racks/dunnage and not on ground.
   - Drainage: no standing water under racks; no water trapping near ends.
   - Stacking: no connection-to-connection contact; couplings not resting on couplings.
   - Strapping/chocks: straps not contacting connection ends; no movement risk.
5) Documentation / traceability
   - Lot/tally identification present and readable (or alternate tracking method).
   - Record findings: note date, inspector, location, count inspected, issues found.

Required actions if problems are found:

- If protector is damaged/loose/missing, replace protector, clean as needed.
- If compound is degraded or missing: remove contaminated storage compound, reapply the new storage compound and reinstall protectors.
- If corrosion or mechanical damage is found, segregate and tag, then clean/inspect per field inspection criteria (FT-FI-001) before disposition.

2.3.2. Rig Site

At the rig site, connections shall be staged to minimize handling and exposure. Pin and box ends shall remain protected until immediately prior to running. Any connection exposed to contamination shall be cleaned and reinspected before use.

- Do not remove thread protectors until the joint is ready to be cleaned/doped.
- If storage compound is removed on location, do not leave cleaned ends exposed. See Section 4.2.2 for timing rules.

3. Running Preparation

Running preparation is critical to achieving consistent, repeatable, and damage-free connection make-up. Inadequate preparation is one of the most common contributors to abnormal torque–turn behavior, seal damage, galling, and loss of connection integrity. All preparation activities shall be completed prior to initiating running operations.

3.1. Drift

Drifting verifies the casing internal diameter is free of obstructions and that drift compliance has been met prior to running. Drifting is required unless explicitly waived by the operator's program. Drift failures are a wellbore risk and shall be managed as a quality hold point.

3.1.1. Drift Requirements

- Drift mandrels shall meet applicable API dimensional requirements, and a special drift mandrel shall be used when required by the program.
- Use a plastic or nylon drift mandrel on all internally coated (IPC) and CRA (Corrosion Resistant Alloy) pipe.
- Drift from box end to pin end to reduce the risk of damaging connection features.

3.1.2. Drift Preparation and Execution

- If available, blow out each joint with compressed air from box end to pin end prior to drifting to remove loose debris.
- Insert the drift mandrel from the box end and allow it to slide through under controlled force.
- The drift mandrel should slide easily through the pipe. Do not force the drift.
- If the drift hangs up, stop and investigate; do not attempt to hammer or drive the drift through.

3.2. Running Tools

All running tools shall be inspected, verified for compatibility, and confirmed to be in proper working condition prior to use. Tools shall be clean, free of damage, and appropriate for the size, weight, and connection configuration being run.

3.2.1. Crossover Subs

Crossover subs are typically used for well control, cementing, or interfacing Fermata® connections with API equipment. Prior to use:

- Verify dimensional compatibility with the connection size, weight, and configuration
- Inspect pin and box threads for damage, contamination, or excessive wear

Damaged or mismatched crossover subs shall not be used.

For doping and torque information, see the connection specific running procedure

3.2.2. Handling Plugs

Handling plugs are used to protect the box connection during handling and running operations.

- Handling plugs shall be always used when running integral or slim-line connections
- When running threaded and coupled connections, handling plugs shall be used any time a CRT or fill up tool is used.
- Handling plugs shall be inspected prior to use and shall be clean and free of debris
- Handling plugs are not lift plugs and shall not be used to support the weight of more than 3 joints, or a combined total of 10,000 lbs
- Handling plugs shall only be made up hand-tight and lightly snugged with a bar; striking with a hammer is not permitted
- Handling plugs shall be removed prior to make-up

3.2.3. Stabbing Guides

Stabbing guides shall be used with every connection make-up.

- Guides shall be properly sized and securely installed
- Stabbing guides shall be used to maintain alignment and prevent cross-threading
- Misalignment during stabbing is a leading cause of thread damage and rejected connections

3.2.4. Low Torque Valves

Low torque valves, when used, shall be inspected before and after operations.

- Verify pressure rating and connection compatibility
- Inspect seal rings for damage or wear
- Confirm proper valve operation (open/close) prior to installation

3.2.5. Circulation Swage

Circulation swages used for fluid circulation shall be inspected prior to use.

- Inspect ID and OD for dents, burrs, corrosion, or deformation
- Inspect sealing surfaces and seal rings
- Verify compatibility with internal coatings or CRA materials

3.3. Running Equipment

Running equipment shall be suitable for the connection geometry and capable of maintaining alignment throughout make-up.

3.3.1. Elevators

Always ensure elevators are not engaged during make-up.

3.3.1.1. Single Joint Elevator

Single joint elevators may be used where appropriate.

- Verify correct size and rating
- Single joint elevators shall only lift one joint at a time

3.3.1.2. Slip Type Elevator

Slip type elevators shall be used for integral, special clearance, and slim-line connections.

- Slip dies shall be clean and in good condition
- Spacers shall be used where required to prevent damage to boxes or couplings

3.3.1.3. Collar Type Elevator

Collar type elevators may be used on threaded and coupled connections.

- Verify proper engagement on the coupling face
- Confirm elevator size matches the connection OD

3.3.1.4. Bottleneck Elevator

Bottleneck elevators designed for drill pipe shall not be used with casing connections unless explicitly approved.

Approval chain:

- Primary approver: Fermata® Engineering
- Field authority (implementation): Fermata® Field Service Management / designated certified thread representative confirms the approved plan is being followed on site
- Operator approval: Company Representative / Drilling Superintendent acknowledges and accepts the deviation for the job

3.3.2. Casing Running Tool (CRT)

Use of a CRT for make-up is generally discouraged. If used:

- Verify torque indicators, load cells, and dump valves are calibrated

- Perform a dump test prior to running
- Rotate the joint counterclockwise prior to make-up to ensure proper thread engagement
- Ensure gripping elements are positioned to avoid contact with threads or seals

3.3.3. Weight Compensators

Use of weight compensators is required when:

- CRA / chrome or galling-susceptible materials are being run.
- Running in stands (double or triple joints), where joint weight and load transfer are higher.
- Stabbing or initial make-up requires minimizing axial load on the threads to prevent damage or galling.
- Running large diameters (13-3/8” and above)

3.3.4. Make-up Tongs

- Rig up power and back-up tongs so the tong frame remains level and perpendicular to the pipe during make-up.
- Snub lines shall be horizontal and oriented 90° to the tong arm to minimize side loading.
- Verify tong alignment using a level prior to running and after any rig-up changes.
- Ensure tong rigging allows the tong to lower gradually during make-up to accommodate make-up loss without bending or misalignment.

3.3.4.1. Power Tong

Power tongs shall:

- Have the correct size and rating for the pipe being run
- Have clean, properly fitted dies
- Be calibrated and verified prior to running
- Be rigged to remain perpendicular to the pipe during make-up

3.3.4.2. Integral Casing Tong

Integral casing tongs with integrated back-up are recommended.

- Back-up mechanisms shall be free to travel to accommodate make-up loss
- Load cells shall be properly installed and calibrated

3.3.4.3. Conventional Casing Tong

When conventional tongs are used:

- Back-up tongs shall be used until sufficient string weight is available, at least 50 joints
- Snub lines shall be horizontal and perpendicular to the tong arm
- Tong weight and rigging shall not induce bending or misalignment

3.3.5. Torque Turn Data Acquisition Equipment

Torque–turn monitoring equipment is required for proper make-up evaluation.

System configuration:

- Use a turn encoder whenever possible. Proximity switches often do not provide adequate pulses per revolution for reliable turn counting.
- Configure the X-axis scale to show an appropriate number of turns to visualize the make-up profile (commonly 5–10 turns for typical casing make-up) and ensure the last ~2 turns are clearly visible at good resolution.
- Ensure the graph is large enough on the display to evaluate features and axis values.

Graph labeling and records:

- Each graph shall include pipe tally/joint ID, time and date, and operator/crew information when available.
- If a graph is rejected, retain the graph with a clear reason for rejection.
- Include comments for observed rig events (slips movement, cable movement, elevators binding, equipment contact, etc.).

3.3.5.1. Torque-Turn Graph

Systems shall record torque versus turns at a sufficient sampling rate. Only competent personnel such as Field Service technicians certified by Fermata® can approve torque-turn graphs.

- Graphs shall capture the full make-up event
- Graph scaling shall allow clear identification of key features
- Configure the graph X-axis so the make-up event is not compressed and the final engagement region is clearly visible. Typical scaling should allow the last 1–2 turns to be reviewed in detail.
- Display the MIN / OPT / MAX torque lines (when available) and show the following values at minimum:
    - Final torque

- Shoulder/lock torque (where applicable) – correct placement to be confirmed by operator
- Delta turns or engagement location (where applicable)

- Each graph record shall include, at minimum:
  - joint/tally identification
  - date/time,
  - operator/crew identification (if available).
- A turn encoder is preferred. If a proximity switch is used, confirm pulses/turn are sufficient to provide stable turn measurement.
- Minimum acquisition rate should be ≥ 500 samples per turn (or equivalent system resolution) where configurable.
- Torque systems shall have calibration records available on site and shall be calibrated per manufacturer's recommendations (minimum annual, unless otherwise required).
- Rerun graphs shall be labeled using a consistent convention (example: 105-1, 105-2) to preserve traceability.

3.3.5.2. Calibration

- All torque measurement systems shall be calibrated at least annually
- Calibration records shall be available on site

3.3.6. Thread Compound

See Section 4.2 for thread compound application.

Thread compound used shall be approved and applied as per Fermata® running procedures. It shall be properly mixed, as per compound manufacturer guidelines.

- Compound shall be free of water and contaminants
- Overapplication or underapplication can adversely affect make-up behavior
- Compound shall be within expiration date

3.4. Job Checklist

A pre-job checklist shall be completed prior to running. See Appendix A.

The checklist shall confirm:

- Correct pipe, connection, and documentation
- Availability and readiness of tools and equipment

- Calibration status of torque measurement systems
- Assignment of personnel roles and responsibilities

3.5. Job Safety Analysis

A Job Safety Analysis (JSA) shall be conducted prior to running operations. The Fermata® certified Field Service/Thread Representative shall participate and provide connection-specific hazards and controls.

4. Running

Running operations shall be performed in a controlled and repeatable manner to ensure the connection is made up within the acceptance window, with proper seal engagement and without thread damage or yielding. The most common drivers of abnormal make-up are poor cleanliness, improper compound type/amount/distribution, misalignment during stabbing or make-up, and improper torque–turn measurement configuration.

4.1. Field Service

Use of a Fermata®-certified and trained field service technician (thread representative) is strongly recommended for all casing runs. If a Fermata®-certified technician is not used, the operator is responsible for approving and ensuring all connection make-ups meet Fermata® acceptance criteria.

When present, the Fermata® field service technician shall:

- Verify the correct running procedure revision and current Connection Data Sheet (CDS) are available at the rig.
- Verify the correct thread compound type is available, within shelf life, properly mixed, and protected from water/contamination.
- Oversee and/or perform thread compound application as required (pipe rack and/or rig floor).
- Verify stabbing practices and alignment controls are being followed.
- Monitor torque–turn data acquisition configuration (scale, sampling, encoder, dump settings, and labeling).
- Review and approve each make-up graph (or a defined sampling plan if agreed in advance), with authority to request corrective actions, break-out, cleaning, and re-make as needed.
- Document abnormal events (slips moving, elevators binding, cables snagging, equipment contacting pipe, etc.) in the graph comments and the field service report.

If the technician must leave the rig floor/tower to apply compound on the pipe rack, they shall notify the rig crew and ensure make-up acceptance coverage is maintained.

4.2. Thread Compound Application

Thread compound application is a controlled process. Incorrect compound type, excessive / insufficient amount, poor distribution, or contamination (water, sand, mud, metal debris) can distort torque–turn behavior and damage the seal or thread surfaces.

4.2.1. General Requirements

Only approved thread compound(s) for the job shall be used.

- Compound shall be stirred immediately prior to use and periodically during use to prevent settling.
- Compound containers shall be closed/covered when not in use to prevent water accumulation and contamination.
- Discard any compound with water contamination, excessive debris, or evidence of separation that cannot be remixed.
- Brushes/applicators shall be clean. Do not use brushes with loose bristles that can shed into seals.
- Do not apply compound over muddy or wet connections. Connections must be clean and dry.

4.2.2. Cleaning

Approved cleaning methods include:

- High-pressure water wash (pressure washer) to remove storage compound and debris.
- Steam cleaning (where available).
- Approved cleaning solvent + lint-free rags/wipes for final wipe-down of threads, seals, shoulders, and relief grooves.
- Nylon or synthetic bristle brushes to work compound out of thread roots and protectors.

Not approved / restrictions:

- Diesel or gasoline-based liquids are not acceptable, as they can interfere with thread compound adhesion and distribution.
- Metal bristle brushes are not permitted on threads/seal areas.
- Do not use abrasives, grinding, wire wheels, or scraping tools on thread, seal, or shoulder surfaces.

Do not leave cleaned threads and seal areas unprotected. Use the timing rule below when a cleaned connection will not be made up immediately.

Table 1: Cleaning Time Table

Time since cleaning (no make-up)	Required action
24–48 hours	Re-protect the connection
48 hours – 7 days	Apply a water-displacing / corrosion-inhibiting spray to threads and seal areas, then reinstall clean thread protectors
≥ 7 days	Reapply storage compound and reinstall thread protectors

4.2.3. Before Compound Application

Before applying running compound:

- Remove the thread protector.
- Remove all storage compound and debris from pin and box threads, seal areas, and any dope relief grooves using approved cleaning methods. See Section 4.2.2.
- Visually verify the connection is clean and dry. Any connection exposed to mud, rain, ice, or airborne dust after cleaning shall be re-cleaned.
- Some connections have Dry Moly (MOLYKOTE®, etc.) surface finish, that might be removed with a pressure washer. If an excessive amount of coating is missing, refer to field service procedure FT-FI-001 for guidance or contact field service.

4.2.4. Application Method

Apply thread compound to areas specified in the specific connection running procedure.

General application practices:

- Apply compound uniformly to the required surfaces using a brush.
    - Fine bristle mustache brush or 1” paint brush
    - The brush should be clean and free of any water.
- Avoid pushing excess compound into seal areas or relief grooves.
- Do not leave lumps, bare patches, or thick deposits.
- Do not contaminate compound with rig floor debris.
- Do not overapply the thread compound
    - Using a measuring spoon to get an idea of proper amount.

Figure 1 – Thread Compound Measurement

The thread compound and application may be altered if approved by Fermata® Engineering

Field practical note: If joints cannot be doped on the rack due to pipe arrangement, the field service technician may apply compound as joints are brought to the rig floor.

4.3. Stabbing

Stabbing is a controlled alignment step intended to start thread engagement without impact or cross-threading.

4.3.1. Alignment Controls

- Always use a properly sized stabbing guide
- Maintain vertical alignment between pin and box centerlines.
- Lower the pin into the box slowly; do not drop or impact the pin into the box.
- If a stab is missed, never attempt to knock the joint in. This can cause damage to the connection. Instead, lift the joint and reattempt stab.
- The driller or stabbing-board personnel shall maintain clear visibility of the stabbing process.

4.3.2. Initial Engagement

The first turns are critical. If resistance is abnormal or engagement is not smooth, stop immediately.

If cross-threading is suspected (tight at the start, irregular engagement, or jerky rotation), back out completely, clean, inspect, and reattempt.

4.4. Make-up Acceptance

Make-up acceptance is based on: (1) meeting torque targets, (2) confirming expected torque–turn profile features (shoulder/lock/seal engagement), (3) absence of yielding or abnormal interference, and (4) any secondary physical indicators (stamps, knurl bands, etc.) where applicable.

4.4.1. Torque Targets

- Torque targets (minimum/optimum/maximum) shall be taken from the latest CDS.
- Any final torque between minimum and maximum is acceptable unless otherwise specified by the CDS or customer requirements.
- Optimum torque is the preferred target for most conditions.
- Maintain the same specified torque targets and compound amounts when applying thread-locking compounds (e.g., Bakerlok®)

4.4.2. Make-up RPM and Gear Control

High RPM during thread interference and shouldering/lock engagement increases galling risk and can distort torque–turn measurement.

- During initial stabbing and first rotation, use slow rotations to ensure no cross-threading.
- Spin-in in high gear at or below the recommended maximum high-gear RPM.
- Shift to low gear before shoulder/lock engagement and maintain low-gear RPM at or below the recommended maximum.

Reference Table 2 for recommended RPMs of the high and low gear. Use low gear as soon as torque begins to build. Reference the Product Description for the connection type.

Table 2: Recommended Max RPM

Connection or Type	Pipe Diameter	Initial Stabbing (rpm)	Running In (rpm)	Torque Build (rpm)
Constrictor® Wedge	≤ 5.500”	5 (high gear)	20 (high gear)	5 (low gear)
	6.000” to 8.625”	5 (high gear)	15 (high gear)	5 (low gear)
	≥ 9.625”	5 (high gear)	10 (high gear)	3 (low gear)
Rattler®	≤ 5.500”	5 (high gear)	40 (high gear)	15 (low gear)
	6.000” to 8.625”	5 (high gear)	20 (high gear)	10 (low gear)
	≥ 9.625”	5 (high gear)	15 (high gear)	7 (low gear)
Hercules® SP Hercules® SL	≤ 5.500”	5 (high gear)	30 (high gear)	15 (low gear)
	6.000” to 8.625”	5 (high gear)	20 (high gear)	10 (low gear)
	≥ 9.625”	5 (high gear)	15 (high gear)	7 (low gear)
Ares™ Ares™ IPC FT-6™/FT-8™	≤ 5.500”	5 (high gear)	20 (high gear)	5 (low gear)
	6.000” to 8.625”	5 (high gear)	15 (high gear)	5 (low gear)
	≥ 9.625”	5 (high gear)	10 (high gear)	3 (low gear)

4.4.3. First Article Make-up

See connection specific running procedure if first article make-up is required.

1. For the first make-up of the run, make the connection to optimum make-up and draw a line across the pin and box.

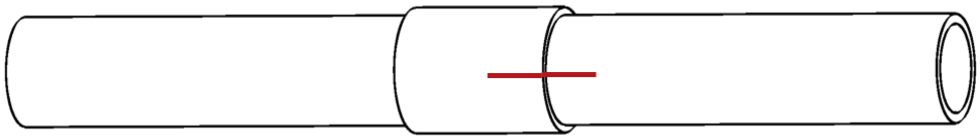

Figure 2 – First article make-up line.

2. Re-apply optimum torque.
   - If movement is under 0.5”, continue the run targeting optimum.
   - If movement greater than or equal to 0.5”, re-apply torque but target a value that is the minimum between the optimum torque +20%, or the operating torque.
     - NOTE: At high torques, the tongs can damage the pipe body.
     - NOTE: Movement can be an indication of excess thread compound. If observed, review the amount of thread compound applied and reduce the amount.

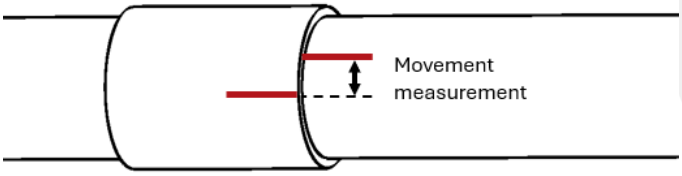

Figure 3 – Movement measurement.

4.4.4. Torque-Turn Graph

Torque–turn graphs are a primary acceptance tool.

Because Fermata® products include multiple connection types, the expected graph feature may be a shoulder point or a wedge lock point depending on design.

4.4.4.1. Make-up Graph Features

General acceptance windows:

- Final torque shall be within the CDS window.
- Shoulder/lock engagement shall occur within an expected portion of the make-up event such that a meaningful portion of torque is applied after engagement.
- See Connection Specific running procedure for graph acceptance details

4.4.4.2. General Terminology

- Thread interference region: the portion of the curve where torque rises primarily due to thread friction/interference prior to shoulder/lock engagement.
- Shoulder/lock engagement: the point where the connection transitions into final engagement (shoulder contact or wedge lock), typically identified by a distinct slope change or spike depending on design.
- Seal engagement region: the portion of the curve after engagement where additional turns/torque contribute to final sealing/contact stress.
- Delta turns (Δ turns): the number of turns between engagement (shoulder/lock) and final torque.
- Delta torque (Δ torque): the increase in torque from engagement to final torque.
- Dump torque: the torque setting that triggers automatic stop/dump (if equipped). Dump torque should be set to land near the target make-up torque unless otherwise specified.

4.4.4.3. Make-up Indicator

Some connections include visual secondary indicators such as triangle stamps or knurl bands. Where present:

- Verify indicator position per the connection-specific running procedure (indicator tolerance is product-specific).
- Secondary indicators do not override torque–turn acceptance; they are used as supplemental confirmation.

4.4.4.4. Make-up Graph Interpretation / Troubleshooting

A make-up can be acceptable even with minor anomalies if the shoulder/lock engagement is clear, final torque is in range, and there is no indication of yielding or severe irregular interference. Below examples of good make-up graphs, as well as acceptable graphs with corrective follow-up, and finally unacceptable make-up graphs.

Example shoulder point requirement (when applicable):

- The shoulder point must be visible.
- Shoulder point must be between 5% and 90% of achieved make-up torque.

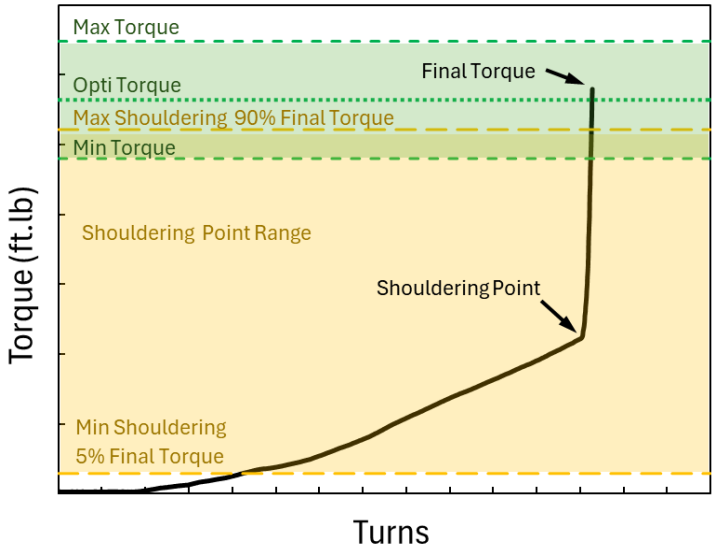

Figure 4 – Example Torque-Turn Signature for a Shouldered Semi-Premium connection.

Example wedge/lock-point requirement (when applicable):

- A lock point must be visible.
- Lock point must be between 5% and 80% of achieved make-up torque.

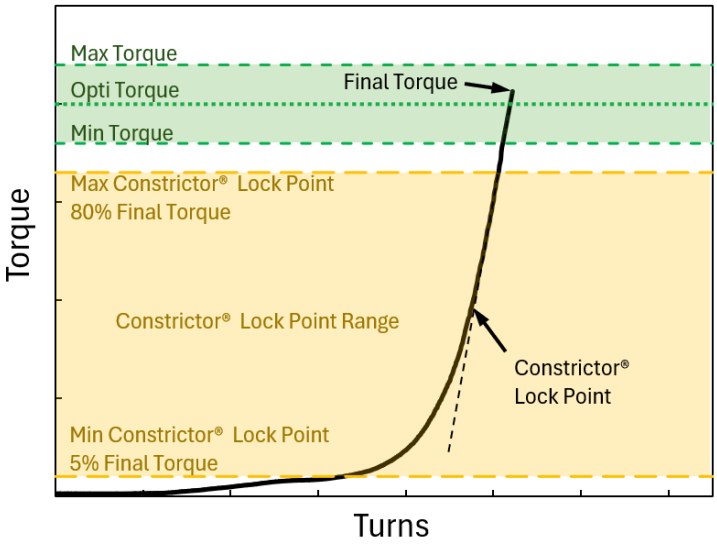

Figure 5 – Example Torque-Turn Signature for a Wedge Semi-Premium connection.

Acceptable Graphs with corrective follow-up (if final torque in range and no yielding):

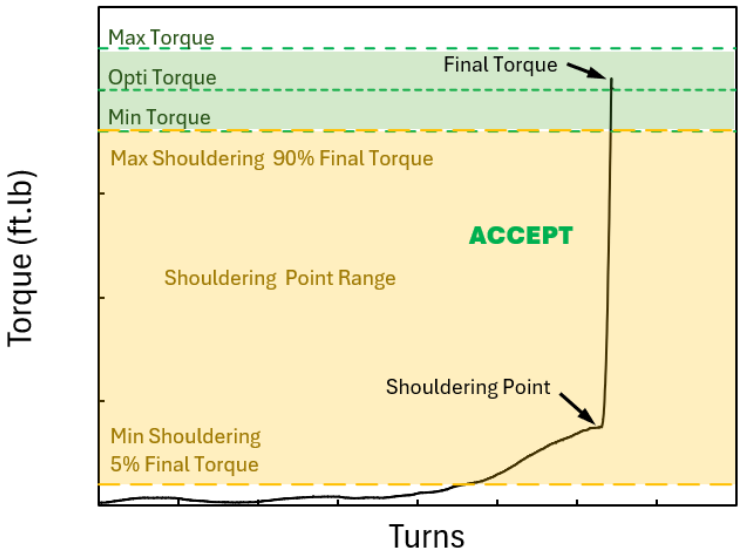

Figure 6: **Wave in graph:** Often caused by excess thread compound, movement in tongs, or equipment contact. Verify compound application and check for movement or oversized equipment.

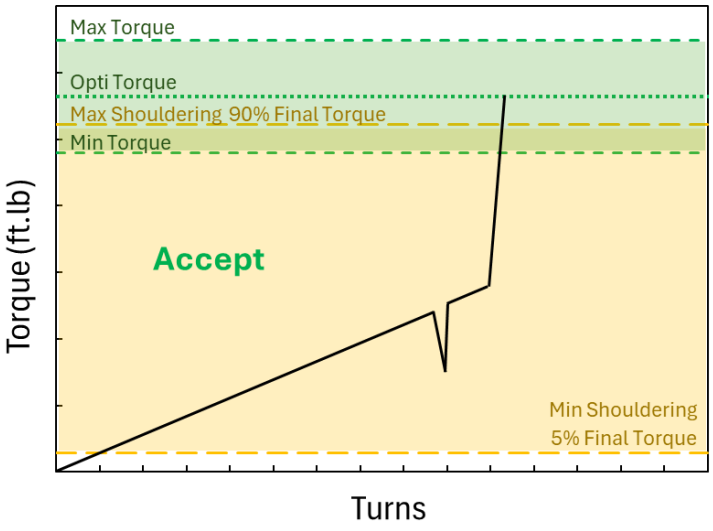

Figure 7: **Slip during make-up:** Back-up tong movement, slips movement, power tong die slip, late shift to low gear. Only acceptable if before shoulder or Constrictor® lock point.
Solution: Secure slips, clean/replace dies.
If after shoulder or Constrictor® lock point – reject / break-out / inspect / remake.

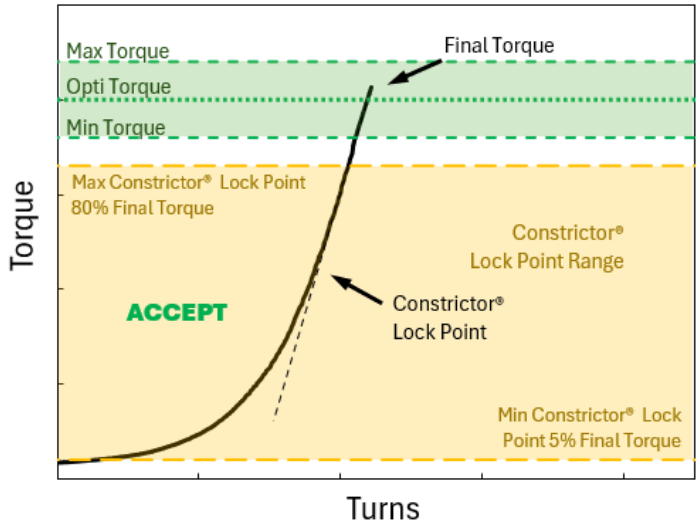

Figure 8: **Short graph:** Possible turn sensor failure or recording issue. Accept **BEFORE** shoulder or Constrictor® lock point. If shoulder/lock point is **NOT** visible – reject / break-out / inspect / remake

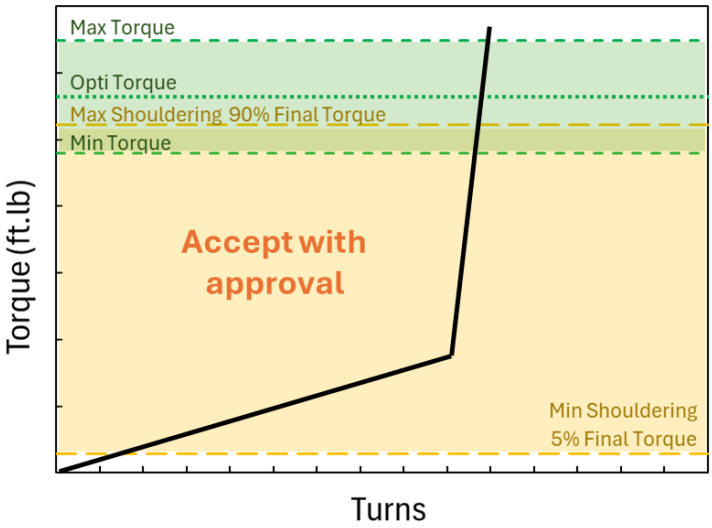

Figure 9: **Late dump:** Possible high/unstable RPM in low gear; power unit revved too high; dump torque too close to max; slow hydraulics.
Solution: Reduce dump torque slightly to dump at optimum while ensuring dump remains above minimum; reduce RPM and stabilize power unit speed.

Unacceptable Graphs (stop, break out, clean/inspect, and do not re-run until resolved):

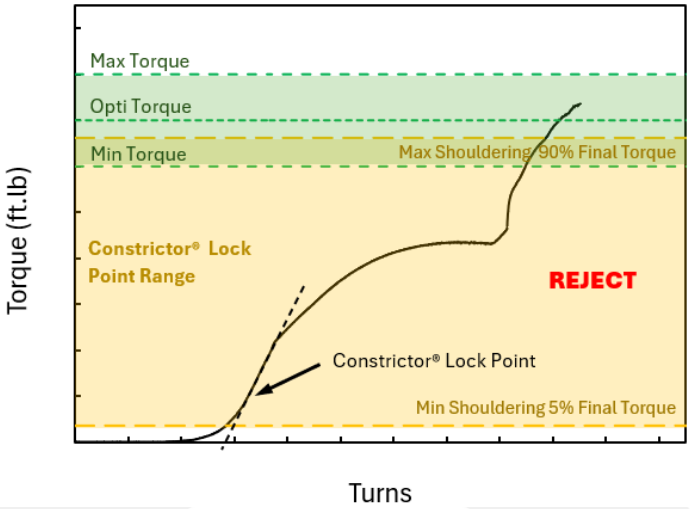

Figure 10: **Dope squeeze/turning coupling:** Verify there is no compound in seal or relief groove, confirm vertical alignment, adjust back-up tong placement if coupling turns

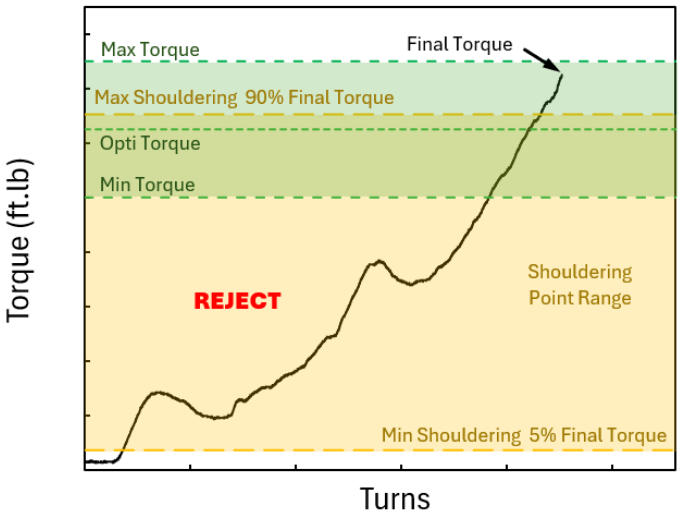

Figure 11: **No discernable shoulder and very wavy graph**: Excessive thread galling or cross-threaded

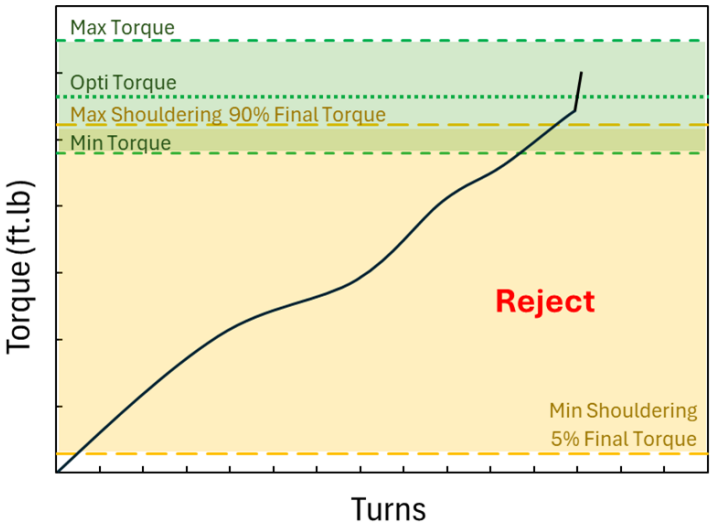

Figure 12: **High shoulder beyond maximum:** possible doping issue, high thread interference, galling, cross threading.

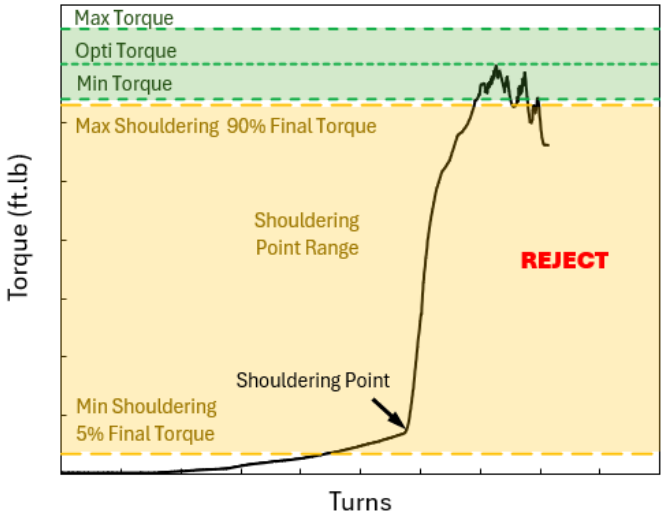

Figure 13: **Plastic deformation / yielding:** any indication of yielding requires break-out and laydown for inspection

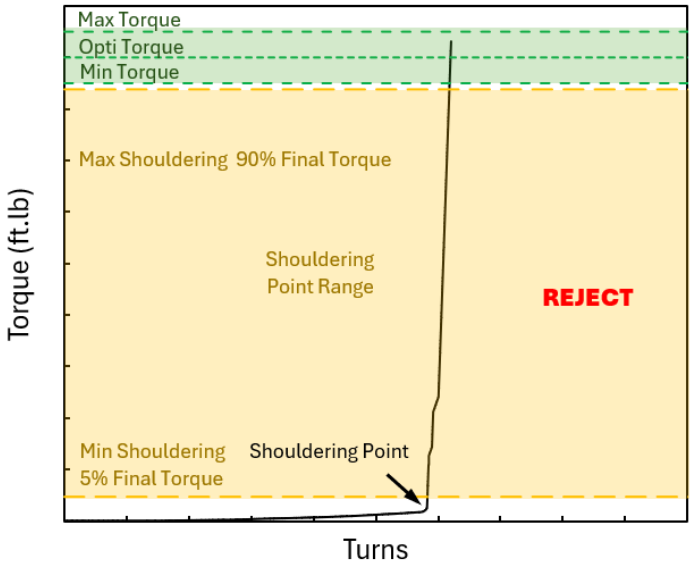

Figure 14: **Low shoulder:** possible seal/thread damage, contamination, misalignment, cross-threading, improper compound.

When abnormal profiles occur, verify:

1. Cleanliness and dryness of threads and seal areas
2. Correct compound type, amount, and distribution
3. Rig alignment and stabbing control
4. Tong rig-up and stability (snub line geometry, tong contact, back-up placement)
5. Torque–turn measurement integrity (encoder, cables, calibration)

If the cause cannot be confidently corrected, stop and contact Fermata® Engineering/Field Service Management.

4.5. Downhole Rotation

Downhole rotation shall comply with the CDS operating limits.

- Maintain rotating torque below the maximum operating torque specified on the current CDS unless reviewed and approved by Fermata® Engineering.
- Operating torque does not inherently account for combined loading (torque + tension). Contact Fermata® Engineering for torque–tension plots/envelopes and application-specific guidance.
- Unless otherwise specified, rotation speed should not exceed 40 RPM.
- Gradually increase or decrease rotation speed and torque to avoid dynamic loading.
- RPM and operating torque may be evaluated and adjusted case-by-case if approved by Fermata® Engineering.

4.6. Connection Break-out and Inspection

Break-outs shall be performed with the same alignment discipline used during make-up.

4.6.1. Break-out Setup

- Verify back-up tongs are equipped with correctly sized dies.
- Place the back-up tongs as close as practical to the power tongs to reduce bending.
- For threaded-and-coupled connections, place the back-up tongs on the appropriate half of the coupling (do not grip on pipe below the coupling on the mill side when breaking out the field end).
- For integral connections, place back-up tongs on the pipe body below the threaded area of the box (avoid gripping on the threaded region).
- Verify vertical alignment and control of the pipe during break-out (stabbing board personnel or stabbing arm).

4.6.2. Break-out Execution

- Break out in low gear to ensure adequate torque capability and control.
- Keep break-out speed low to reduce galling risk (preferably ≤5 RPM).
- Break out slowly until the pin “jumps,” indicating disengagement.
- Use a stabbing guide prior to disengagement to prevent the pin from swinging and damaging the box ID.
- Do not strike connections with a hammer or hard object

4.6.3. Post Break-out Cleaning and Inspection

- Remove all thread compound, mud, and debris.
- Clean and dry the connection.
- Inspect in accordance with FT-FI-001 (Field Visual Inspection and Repair Requirements) or the applicable field inspection standard.
- Connections with galling, gouging, or damage that cannot be repaired shall be identified and laid down.

4.6.4. Re-running a Connection

Re-running a connection is permitted only after the connection has been fully broken out, cleaned, and confirmed acceptable by inspection. A re-run shall be treated as a new make-up event—do not "pick up" mid-process or reuse partial compound application.

4.7. Laydown and Marking Instructions

When laying down pipe or removing joints from service:

- Apply an approved storage compound to threads and machined surfaces and install clean, properly sized thread protectors.
- Ensure protectors are clean and free of grime, debris, and foreign contaminants prior to installation.
- Tag and clearly mark joints requiring repair or rejected joints.
- Categorize all used/rejected/repairable/prime pipe remaining at the rig location per the field classification summary used for the job.
- Notify the rig supervisor and submit the repair/rejection report to Field Service Management as soon as possible.

Nonconforming joints shall not be run unless dispositioned by the operator's representative and Quality/Engineering as applicable.

4.8. Contact Information

Technical Support: (281) 941-5257, support@fermata-connections.com

Field Services 24/7 Operations: (855) 322-7104

Appendix A – Job Checklist

- ☐ Pipe on location matches program (OD / weight / grade / connection / quantity).
- ☐ Latest revision of following documents on site and verified:
  - Connection Data Sheet
  - General Running Procedure
  - Connection-specific Running Procedure
- ☐ Roles assigned: tong op, torque-turn op, stabbing/spotter, and qualified graph approver.
- ☐ Pre-run meeting + JSA completed
- ☐ Running compound on location, correct type, mixed/stirred, lid control, clean (no water/debris), within expiration date.
- ☐ Correct cleaning gear available (washer/steam/approved solvent/rags).
- ☐ Correct brushes available (nylon/synthetic OK; no metal bristles).
- ☐ Inspection capability ready (qualified inspector + criteria).
- ☐ Drift plan ready (proper drift; plastic/nylon drift for CRA/IPC).
- ☐ Thread protectors correct, clean, snug; keep on until joint is ready to stab; never install dirty protectors.
- ☐ Running tools present/inspected: handling plugs, stabbing guide, etc.
- ☐ Equipment ready/compatible: correct elevators on site; questions resolved before starting.
- ☐ Torque-turn system ready (torque vs turns; labeling/joint ID capture; plan for comments, within calibration).

Appendix B – Long-Term Storage Periodic Inspection Checklist

Category	Inspection item	OK	Issue	Notes / Joint IDs / Photos Ref
Thread Protectors	Protectors installed on all stored ends.	☐	☐	
	Protector fit: snug / fully engaged (not cross-threaded, not loose)	☐	☐	
	Protector condition: no cracks, deformation, missing threads, heavy wear	☐	☐	
	Protector cleanliness: no packed dirt/sand; no standing water inside	☐	☐	
	Seal/closure present (if applicable) and intact	☐	☐	
Storage Compound	Storage compound present (if used) and provides continuous coverage	☐	☐	
	Compound condition: not dried out, washed off, separated, or contaminated	☐	☐	
	No evidence of water intrusion/emulsification (milky appearance, pooling)	☐	☐	
Corrosion / Damage	No corrosion visible on accessible end areas (rust, pitting, staining)	☐	☐	
	No mechanical damage near ends (dents, gouges, impact marks)	☐	☐	
	No signs of mishandling (crushed protectors, scrape patterns, bent ends)	☐	☐	
Storage Conditions	Tubulars stored on racks/dunnage (not directly on ground)	☐	☐	
	Adequate drainage: no standing water / water traps near ends	☐	☐	
	No connection-to-connection contact; couplings not resting on couplings	☐	☐	
	Straps/chocks not contacting connection ends; stack stable (no movement risk)	☐	☐	
Traceability	Joint/lot/tally identification readable and traceable	☐	☐	
	Records updated (date, count inspected, issues logged)	☐	☐	