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AN OPERATOR'S GUIDE TO API TESTING FOR CENTRALIZERS AND STOP COLLARS

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This guide is essential reading for:

- Operators and drilling engineers responsible for wellbore integrity
- Procurement professionals and supply chain teams sourcing casing accessories
- Distributors and service companies supplying centralizers and stop collars
- QA/QC personnel and technical auditors reviewing compliance and documentation

With the rollout of the 7th Edition of API 10D and the removal of API audit and monogram programs in 2021, the responsibility for ensuring centralizer and stop collar compliance now rests squarely on operators.

This guide provides:

1. A comprehensive breakdown of the API testing protocols
2. Clarity on re-testing and reporting requirements
3. Insight into the technical performance standards and their implications for downhole performance
4. Guidance on what procurement teams should now look for in a manufacturer
5. Helps stakeholders make informed, confident decisions about casing accessories in a shifting regulatory environment—protecting both well performance and operational reputation.

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INTRODUCTION

With the removal of the API 10D Monogram for Centralizers Program in 2021, a significant shift has occurred in the way centralizers and stop collars are qualified and trusted for use downhole. Historically, the API monogram served as a clear and independent marker of compliance—giving operators, distributors, and procurement teams confidence that a product had met standardized testing overseen by API-accredited audits.

QUALITY ASSURANCE IS NO LONGER GUARANTEED

In the absence of third-party verification and regular API audits, the responsibility now falls directly on operators, service companies, and distributors to verify the legitimacy and accuracy of testing data supplied by manufacturers. This introduces a new level of complexity and risk to procurement and tendering processes, particularly with the rollout of the 7th Edition of API 10D, which introduces more stringent and realistic performance on conventional and under reamed applications, including multiple point data and adjusted consideration of centralizer OD loss.

The implications are clear: it is no longer enough to take compliance claims at face value. Without an API audit trail, each manufacturer's testing protocols must be scrutinized independently. Datasheets and product claims must be supported by transparent, traceable test documentation. Procurement specifications must be revised to reflect the new standard. And operators must now adopt a more rigorous technical due diligence process to ensure the products they deploy are not only effective—but proven.

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This guide is designed to help you navigate these new demands. It outlines the testing protocols defined in API 10D 7th Edition, explains what to look for in supplier documentation, and provides practical guidance for validating centralizers and stop collars in a post-monogram world.

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API OVERVIEW

API 10D Specifications defines the requirements for **bow-spring**, including testing methods, and performance criteria. The standard is widely accepted by operators to benchmark product reliability in a range of downhole conditions. The **7th Edition** of API 10D, released in 2021, introduced notable updates (see page 11)

This guide also covers recommendations for API 10D-2 which covers stop collar testing methodology.

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API 10D TESTING PROTOCOLS: CENTRALIZERS

Manufacturers must follow a rigorous set of testing procedures to validate the mechanical performance of their centralizers.

The key tests include:

START, RESTART & RUNNING FORCE TEST

This test measures:

- The force required to initiate movement of a centralizer in the open hole.
- Restart and running forces which are accumulative forces, per centralizer.

The start, restart & running force test in API 10D reflects how easily a centralizer can travel through the wellbore. If the drag is too high, the casing can get stuck or damaged, especially in tight-tolerance, deviated, or under-reamed holes.

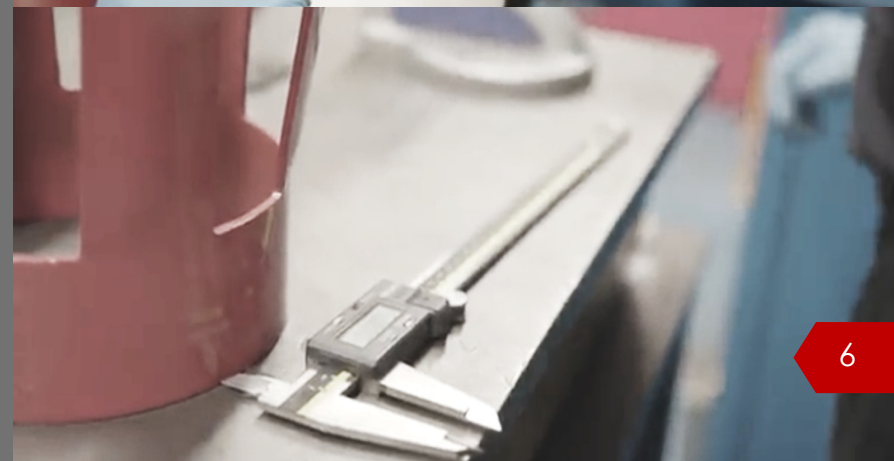
STANDOFF TEST

This test measures:

- The mean of standoff (μ) at 50%, 100%, 150%, 200%, 250%, and 300% of API test load.
- The ability of the centralizer to flex and support the casing as it moves through the hole
- How well the centralizer returns to its original shape.

Standoff is a critical factor in cementing success. Higher casing standoff improves cement bonding. Proper standoff ensures:

- Even cement distribution around the casing
- Effective zonal isolation
- Reduced risk of poor cement bonding or channeling
- Improved well integrity and long-term performance



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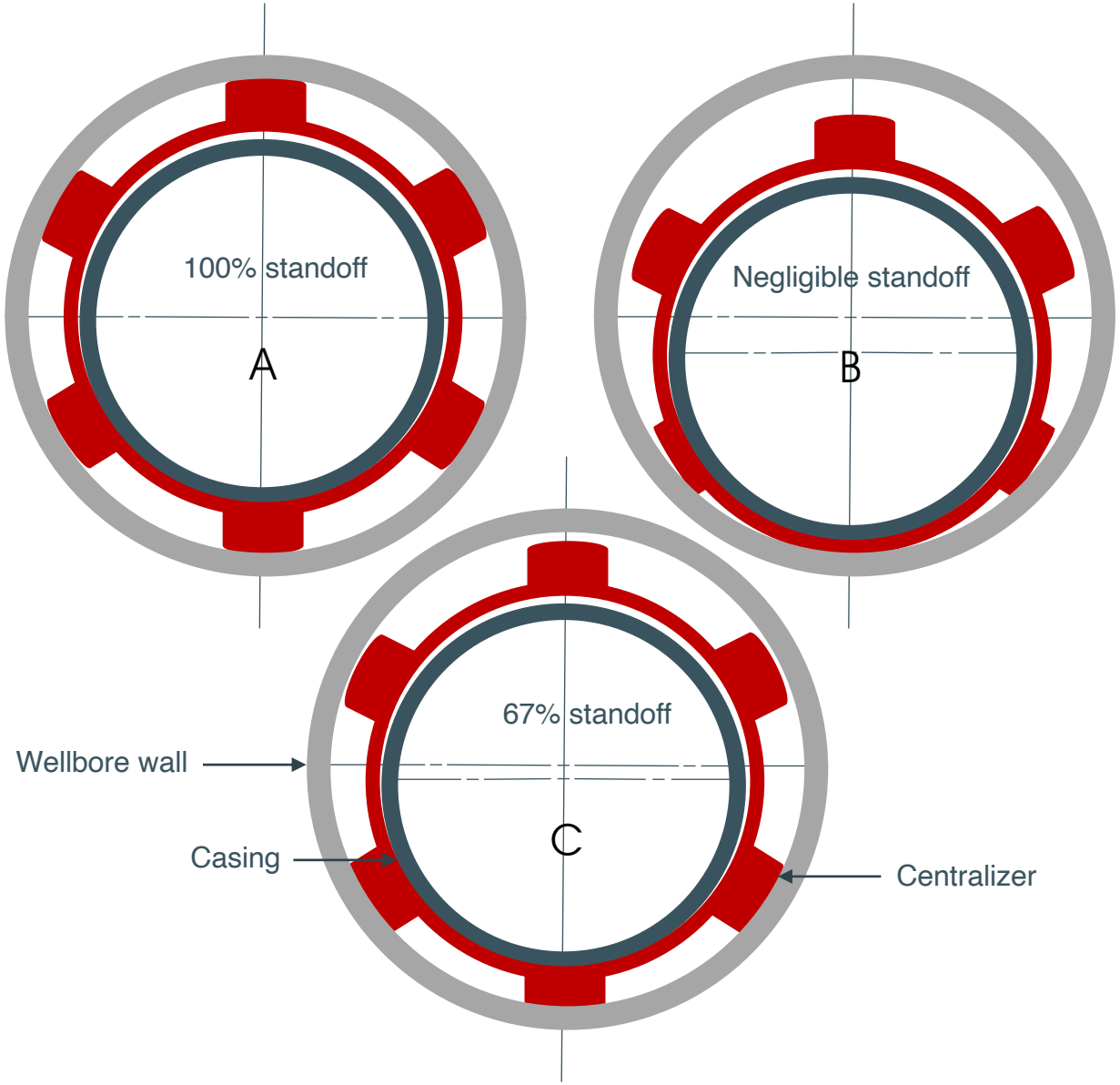

WHAT IS STANDOFF?

Standoff refers to the distance between the casing (or liner) and the wellbore wall, maintained by the centralizer.

Standoff (%) = (Radial distance between casing and borehole wall / Annular clearance) × 100

In simpler terms, it measures how well-centered the casing is inside the borehole.

- A 100% standoff means the casing is perfectly centered (equal clearance all around). See figure A.
- A 0% standoff means the casing is resting directly on the borehole wall (no clearance on one side). See figure B.

The 7th Edition of API 10D specifies a minimum standoff of 67% for a centralizer to be considered compliant for standard applications—raising the bar for performance under real-world running conditions. See figure C.

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API 10D-2 TESTING RECOMMENDED PRACTICE: STOP COLLARS

AXIAL LOAD (SLIP) TESTING

To verify that the stop collar can hold the centralizer in place under simulated downhole forces.

- Simulates axial forces applied to the collar to ensure it doesn't slip.
- Key for applications where centralizers must remain in place during casing running.

COMPATIBILITY TESTING

Ensuring that the stop collar does not negatively affect the performance or structural integrity of the centralizer.

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The API 10D-2 Testing Recommended Practice for Stop Collars is not an official standard, but a guideline—meaning manufacturers are not obligated to follow a uniform testing method. As a result, when comparing stop collar performance—particularly for slippage and holding force—additional scrutiny is essential. Differences in test procedures, setup, and interpretation can lead to misleading comparisons, so it's important to assess whether testing was carried out in alignment with the API 10D-2 recommendations and under consistent, realistic conditions.

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7TH EDITION RE-TESTING REQUIREMENTS

DESIGN CHANGES:

Any modification to materials, dimensions, or manufacturing processes requires re-testing.

After ≥500 centralizers for a part number have been manufactured in the last 12 months.

After ≥1,000 centralizers for a part number have been manufactured since it was last tested.

After ≥3 years since this part number was last tested.

Operator request:
In some contracts, re-testing is required before large-scale deployment or under specific well conditions.

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7TH EDITION REPORTING REQUIREMENTS

API 10D 7TH EDITION SPECIFIES THE FOLLOWING REPORTING REQUIREMENTS FROM MANUFACTURERS FOR CONVENTIONAL APPLICATIONS:

- Centralizer part number
- Casing nominal diameter
- Open hole diameter (ID)
- Starting force of centralizer in open hole
- Restarting force of centralizer in open hole
- Running force of centralizer in open hole
- Centralizer installation method
- Description of centralizer coating, if present.
- Centralizer starting force test orientation (pull-in or push-in configuration)
- The mean of standoff (μ) at the following percentages of API test load; 50%, 100%, 150%, 200%, 250%, and 300%.

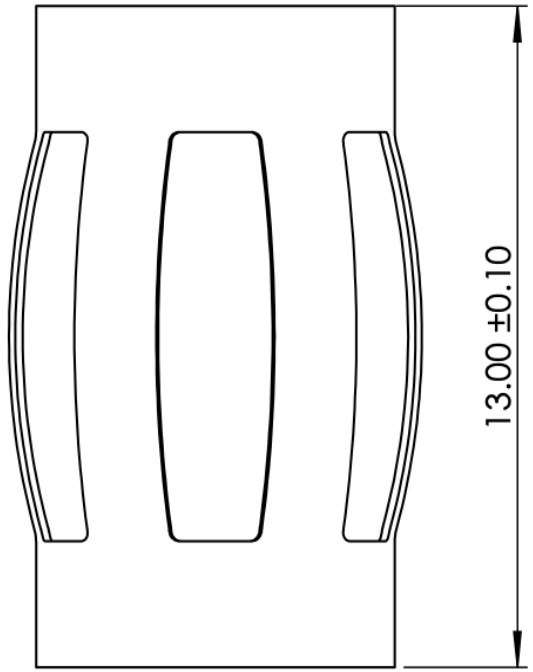
And the following in addition for under-reamed applications:

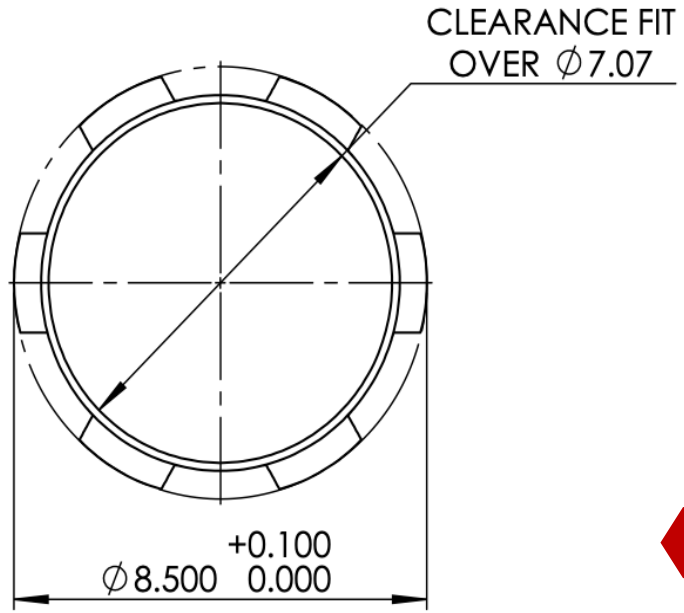
- Restriction diameter
- Starting force of new centralizer in restriction and in the open hole after running through restriction
- Restarting force of new centralizer in restriction and in the open hole after running through restriction
- Running force of new centralizer in restriction and in the open hole after running through restriction
- Open hole diameter (ID), or open hole diameter (ID) range

In addition, Operators and procurement professionals can request:

- QA/QC documents
- Traceability information (batch numbers, material certifications)
- Certificate of Conformities

Some operators request third-party witnessed testing for high-stakes wells.





TESTING GUIDELINES: 5 THINGS OPERATORS SHOULD LOOK FOR

When selecting a centralizer or stop collar supplier, procurement and supply chain teams should evaluate:

1. API 10D COMPLIANCE

- Request updated API 10D 7th Edition-compliant centralizers
- Clarify whether datasheet values reflect legacy or current test protocols
- Check that datasheets supplied meet the required standard – see page 10

2. MANUFACTURING CAPABILITIES

- Check if manufacturer has ISO/API Q1 or equivalent quality management system.
- Insist on traceability and batch-level QA documentation

3. TRACK RECORD

- Ask for references from similar wells, especially in demanding applications (ERD, HPHT, deviated wells).

4. PRODUCT LINE SUITABILITY

- Check if supplier has full range of centralizers to match well geometry, doglegs, and casing sizes.
- Understand whether stop collars range fits casing specs and is compatible with centralizer designs.

5. R&D AND INNOVATION

- Request information on manufacturer's engineering team and field support for better customization options and long-term value.

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Until the industry aligns on full adoption of the 7th Edition, due diligence at the point of procurement is the best safeguard against non-compliant or underperforming centralizers.

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HOW API 10D IMPACTS DOWNHOLE PERFORMANCE

API testing isn't just box-ticking—it directly influences the future performance of the well in several critical ways.

01

02

03

Zonal isolation: API testing ensures centralizers provide adequate standoff, which is critical for effective cement placement. Poor standoff allows fluid channels to form in the cement sheath, compromising zonal isolation and increasing the risk of crossflow between formations—potentially leading to production loss, safety issues, or environmental impact.

Casing integrity: Centralizers that don't meet the API start and running force requirements can significantly increase resistance during casing deployment, especially in deviated or extended-reach wells. Excessive drag can damage casing, cause wear, or result in the casing getting stuck—all of which add cost, delay operations, and risk the success of the well.

Well life: API 10D testing helps validate centralizer performance that leads to better cement bonding, which is essential for maintaining wellbore integrity over time. Good bonding protects the casing from corrosion, minimizes fluid migration, and reduces the need for remedial work—ultimately extending the productive life of the well and lowering long-term operational costs.

KEY UPDATES IN API 10D 7TH EDITION

THE 7TH EDITION INTRODUCED REFINEMENTS BASED ON FIELD LEARNINGS AND OPERATOR FEEDBACK.

- Clarified definitions for test configurations and performance thresholds.
- Updated test tolerances, especially around restoring and running forces and test equipment.
- Improved standardization of test environments for repeatability and fairness.
- Greater emphasis on documentation and traceability.

These changes improve confidence in product performance and align API 10D more closely with real-world conditions.

Key Updates to Centralizer Testing

- Flexing on each bow has been reduced from 12 times to 3 times
- To establish initial API performance, 3 products need to be tested (previously it was 6). All 3 need to be within the requirements. The average standoff is taken as the benchmark for future tests
- Restoring force is no longer used in determining whether a centralizer meets the requirements
- For design and process verification, the standoff at API test load for all bow-spring centralizers must have a coefficient of variation (CV) of 15% or less
- Running force is the mean value in (at least) the last 2 inches of travel
- Introduced under-ream centralizer testing

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IMPLICATIONS OF THE SLOW IMPLEMENTATION OF 7TH EDITION

The introduction of the 7th Edition of API Specification 10D represents a significant shift in how, especially, centralizer performance is measured and reported. The pace of adoption across the industry has been slow bringing with it several challenges.

TEMPORARY NON-COMPLIANCE ACROSS THE BOARD

At present, many centralizers on the market do not yet meet the full requirements of the 7th Edition. With the new standard setting stricter criteria—many existing products fail to comply. This industry-wide gap leaves buyers in a difficult position.

LACK OF CLEAR TIMELINES

There is no fixed deadline for compliance with the new edition, creating uncertainty around when manufacturers are expected to meet the new requirements. This lack of timing makes it hard for operators and procurement teams to plan transitions or enforce compliance.

CHANGING DATASHEETS AND CONFUSION OVER TEST VALUES

As manufacturers begin to adopt the 7th Edition's protocols, datasheets will be updated to reflect new test results. However, because this rollout is uneven, procurement teams must now compare legacy test values with new, more conservative figures, often without clarity on what methodology was used. This undermines confidence in datasheet comparisons and increases the burden on technical evaluation teams.

REVISIONS TO SPECIFICATIONS AND TENDER DOCUMENTS

With the inclusion of under-reamed applications in the 7th Edition, tender documents may also require revision. Procurement teams will need to ensure that their specifications account for these changes, or risk accepting bids based on outdated or incomplete test regimes.

NO MORE API AUDITS OR MONOGRAM PROGRAM

The discontinuation of the API 10D Monogram and related audit program means there is no longer a single, independent method of verifying compliance. Buyers can no longer rely on the presence of an API Monogram as assurance of conformity. This shifts the onus onto operators and distributors to qualify manufacturers themselves through deeper technical reviews and quality audits.

AMBIGUITY IN INTERPRETATION OF TEST CRITERIA

Certain elements of the 7th Edition remain open to interpretation, especially in the absence of an official audit mechanism. Definitions around pass/fail conditions, test set-up, and result reporting may vary by manufacturer, introducing the risk of inconsistent product quality or misleading performance claims.

LOSS OF API ACCREDITATION: INDUSTRY IMPACT

Historically, API accreditation provided a robust, third-party verification process for manufacturers of centralizers and stop collars, ensuring consistency, quality, and compliance with API Specification 10D. However, API no longer offers accreditation or the API Monogram program for API 10D so there is no longer an official third-party mechanism to verify compliance.

WHAT THIS MEANS FOR THE INDUSTRY

The removal of API's formal accreditation for API 10D has several implications:

- Loss of standardized oversight: Without API audits and the ability to carry the API Monogram, there is now greater variability in how manufacturers interpret and implement the specification.
- Increased responsibility on operators and distributors: Buyers must now be more diligent in evaluating suppliers' internal quality systems, testing protocols, and documentation to ensure they meet the intent of the specification.
- Risk of inconsistent performance: Without third-party oversight, there's a heightened risk of unverified claims regarding compliance—potentially leading to the use of centralizers or stop collars that may not perform adequately downhole.
- More pressure on technical validation: Engineers and procurement teams must rely more heavily on thorough reviews of test reports, performance data, and traceability documents.

WHAT OPERATORS AND PROCUREMENT SHOULD LOOK FOR NOW

In the absence of API-monogrammed assurance, operators and procurement teams should:

1. Review quality management certifications, such as ISO 9001 or API Q1, as indicators of a robust internal QA process.
2. Ask about internal testing facilities and protocols, including whether testing is conducted to the full extent of API 10D 7th edition, and if any third-party validation is used.
3. Seek proven field performance data to complement lab-based results.
4. Request a factory visit

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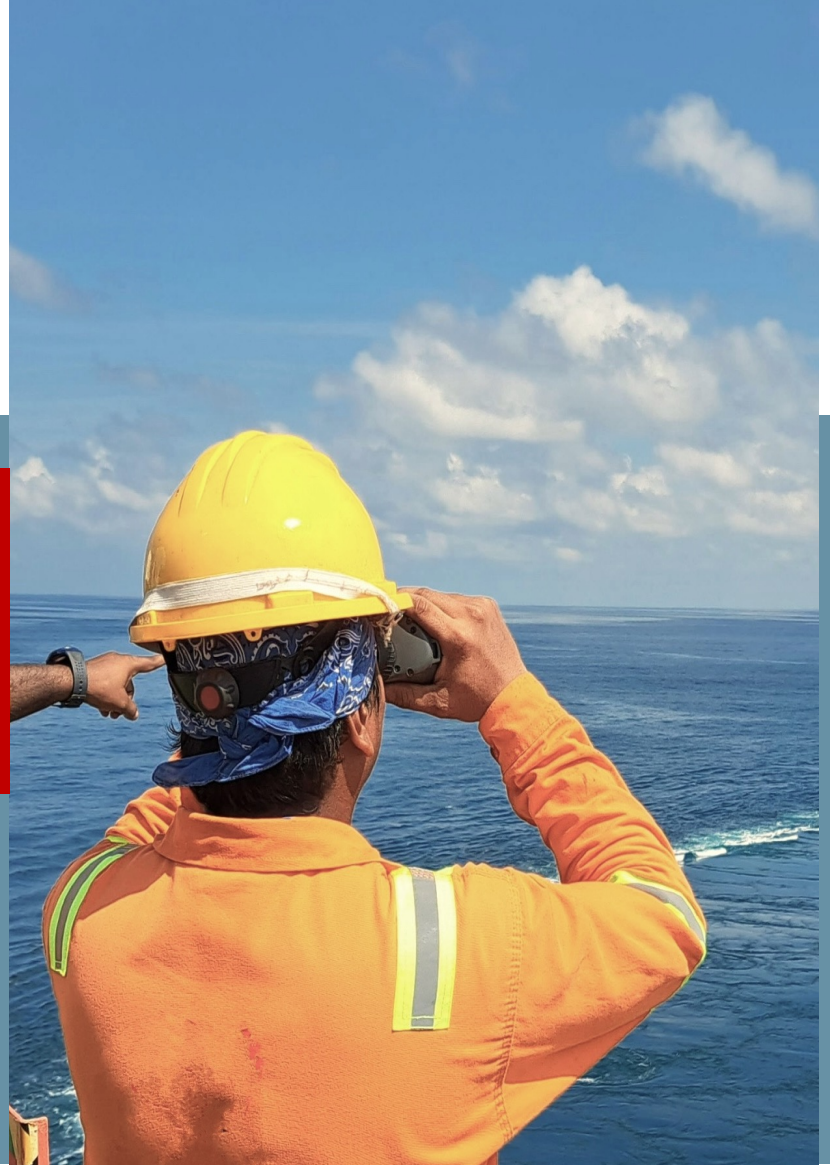
While the API's exit from formal accreditation for this standard has created a gap, it also reinforces the importance of working with manufacturers who demonstrate transparency, technical competence, and a commitment to quality through their own rigorous internal processes.



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THE ROLE OF TEST DATA IN SIMULATION SOFTWARE

Centralizer and stop collar performance data is not just a marketing tool—it is a foundation effective running of casing and cementing

One of the most common and trusted methods operators use to select the type, quality, and quantity of centralizers for a given application is through simulation software.

These programs, often run by service providers or in-house drilling engineers, model casing deflection, fluid displacement, and standoff profiles along the wellbore to ensure effective cement placement, zonal isolation, and long-term well integrity.

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At the core of every simulation is one thing: manufacturer-supplied performance data based on physical product tests

THE SIMULATION CHAIN: FROM TEST BENCH TO DOWNHOLE

SIMULATION TOOLS RELY ON ACCURATE INPUT DATA FOR:

- Starting and restarting force
- Running force
- Standoff under specific loading conditions

This data must reflect real-world conditions as defined by API 10D 7th Edition—considering actual hole sizes, centralizer wear, and realistic deployment forces.

THE RISK OF INACCURATE OR INCONSISTENT DATA

If the test data entered into a simulation programme is inconsistent, outdated, or—worse—overstated, the output can lead to misinformed decisions that put the well at risk.

CONSEQUENCES INCLUDE:

- Inadequate centralizer placement leading to poor standoff
- Insufficient mud removal and poor cement bonding
- Channeling, micro-annuli, and long-term integrity failure
- Increased NPT (Non-Productive Time) or costly re-runs
- Regulatory non-compliance in high-spec environments

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Even small discrepancies in starting force or standoff values can lead to big differences in predicted outcomes downhole. Simulations are only as reliable as the data it's built on. In a post-monogram environment, ensuring the integrity of that data is one of the most important steps operators and procurement teams can take to protect the well, reduce risk, and ensure long-term performance.

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WHAT THIS MEANS FOR OPERATORS

The transition to the 7th Edition of API 10D introduces both opportunities and challenges for buyers and specifiers of centralizers. With the removal of API monogram audits and evolving compliance timelines, procurement teams and operators must take a more proactive role in verifying product performance and documentation.

These are the key actions and considerations to help Operators navigate this period of change and ensure centralizer selections continue to support well integrity and operational success.

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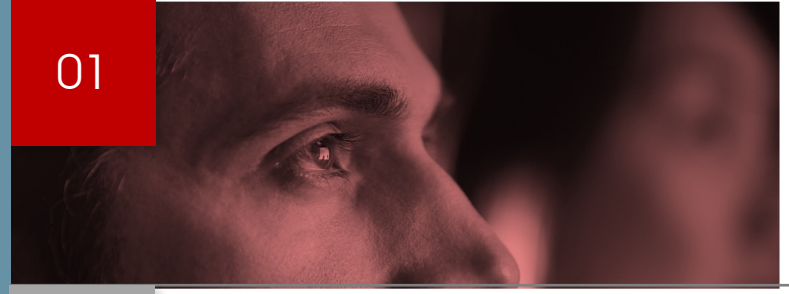

Be extra vigilant: You must ask not only whether a centralizer is API 10D compliant, but which edition it is tested to—and when.

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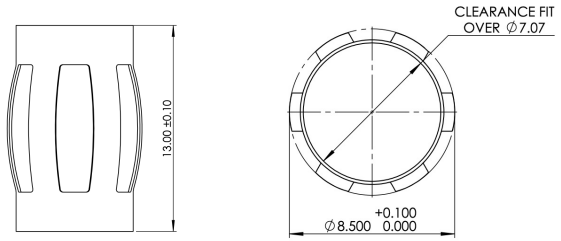

Demand transparency: Insist on detailed datasheets, clearly labelled with edition references, test dates, and conditions.

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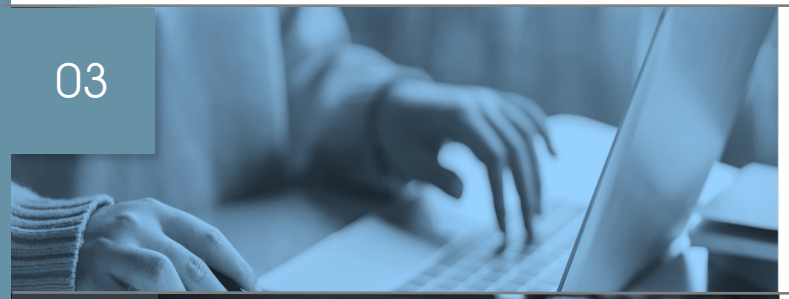

Update specifications: Ensure internal documentation and tender requirements reflect the 7th Edition where applicable.

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Be prepared for interim inconsistencies: Expect variability in product claims and testing documentation until broader adoption is achieved.

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Qualify suppliers carefully: In the absence of API audits, focus on a supplier's internal testing rigor, QA certifications (e.g., ISO/API Q1), and history of field performance.

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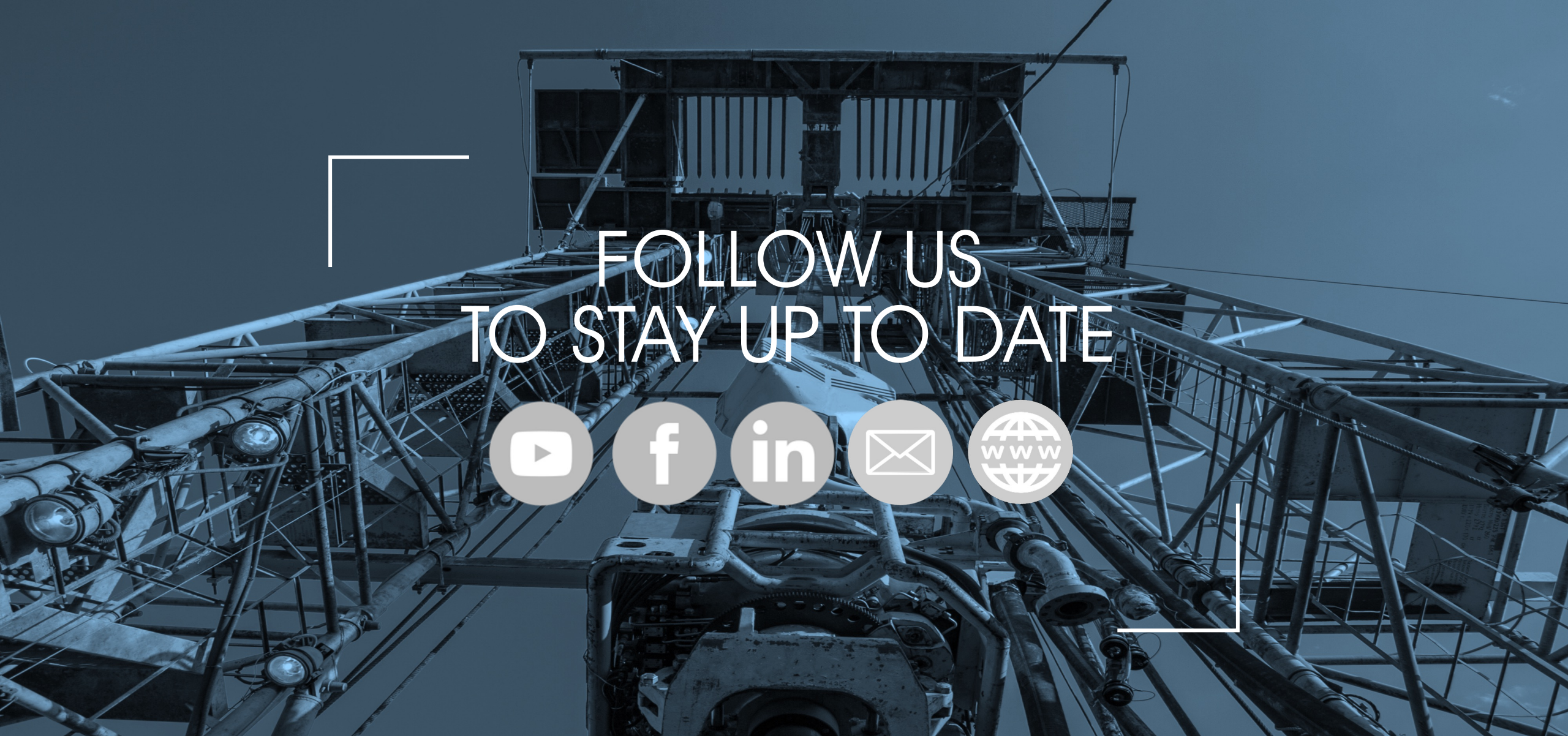
CONCLUSION

API 10D testing is not just regulatory—it is foundational to well performance and safety. A manufacturer's ability to provide transparent, reliable testing data and align with the 7th Edition is a critical marker of quality.

Whether you're selecting a supplier or verifying a centralizer for your next well, keep this guide on hand to make informed, performance-driven decisions.



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