


**STUPPCORP**  
**Revisions to API 5L 44<sup>th</sup> Ed.**  
**Presented to: NAPCA**  
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**Outline**

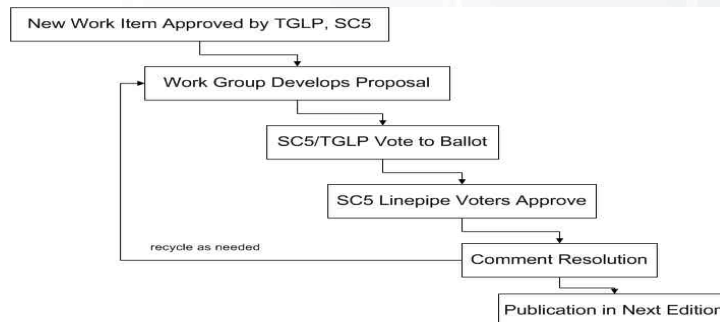
- Background on API 5L & Standards Development Process
- Recent Industry/Regulatory Concerns
- Revisions to API 5L
- Timeline for Publication

## Scope of API 5L

- Specifies requirements for the manufacture of two product specification levels of seamless and welded steel pipes for use in the petroleum and natural gas industries
- Covers a wide range of products
  - Seamless, HFW, LW, and SAW, COW - longitudinal seam and helical (spiral) seam
  - Diameters from 0.4" to 84", Wall Thickness from 0.068" to 2.050"
  - Range of steel chemistries and processing (As-rolled, normalized, Q&T, and thermomechanical rolled)
  - Over 80 items "by agreement", "unless otherwise agreed" or "if agreed"
  - Optional Annexes for sour service, offshore, TFL, resistance to ductile fracture propagation, MPS, jointers, NDT, etc.
  - Purchasers may supplement requirements

## Development of 5L

- API SC5, Task Group on Line Pipe (TGLP) responsible for maintenance of 5L
- Participants include users, manufacturers, customer rep's and consultants
- Process designed to achieve consensus
- Active participation of volunteers is essential to ensure 5L is up to date and meeting industry needs



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Timeline of Development of 5L		
Mar. 2007	ISO 3183, 2 <sup>nd</sup> Ed.	Developed by Joint API/ISO Workgroup for Harmonization
Oct. 2007	API 5L, 44 <sup>th</sup> Ed. (3183 + Annex N, O)	<ul style="list-style-type: none"> <li>•Retest requirements</li> <li>•Repair weld qualification</li> <li>•Hardness test locations</li> <li>•Marking</li> </ul>
Jan. 2009	Errata	•Editorial errors without technical changes
Feb. 2009	Addendum 1	<ul style="list-style-type: none"> <li>•Processes requiring validation: pipe forming, seam welding, repair welding, heat treatment for SAW &amp; COW pipe</li> <li>•Requirements for threaded and coupled pipe</li> <li>•Flattening test acceptance criteria</li> <li>•Test piece type for the tensile test</li> </ul>
April 2010	Addendum 2	<ul style="list-style-type: none"> <li>•X90Q, X100Q for seamless</li> <li>•Open hearth steelmaking with secondary refining</li> <li>•Jointer length requirements</li> <li>•Charpy test location</li> <li>•Chemistry (B)</li> <li>•Metallographic testing for seam weld cross penetration</li> <li>•Out of roundness measurement</li> <li>•Hardness, DWT, HIC retest requirements</li> <li>•Revise repair weld requirements for clarification</li> </ul>
4Q 2010 (expected)	Addendum 3	<ul style="list-style-type: none"> <li>•Manufacturing Procedure Specification</li> <li>•Inspection and Test Plan</li> <li>•Qualification of coil/plate</li> <li>•Return to the tensile testing frequency of the 43<sup>rd</sup> edition</li> <li>•Flattening retest requirements</li> </ul>
2011 (expected)	5L, 45 <sup>th</sup> Ed. / ISO 3183, 3 <sup>rd</sup> Ed.	<ul style="list-style-type: none"> <li>•Re-harmonization of API 5L / ISO 3183</li> <li>•Marking of multiple grades</li> </ul>

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<h3>Recent Industry Concerns</h3> <ul style="list-style-type: none"> <li>• 2008-2009 was a period of high pipe demand in US with lots of pipe sourced from around the world</li> <li>• Some pipe found with low and variable YS (as low as 14 ksi below), and some pipe expanded in body during field hydrostatic testing.</li> <li>• May 2009: PHMSA advisory bulletin on low yield and tensile strength in high-strength microalloyed pipe</li> <li>• June 2009: INGAA Pipe Summit to develop action plan</li> <li>• January 2010: API workgroups initiated to develop proposed changes to API 5L. Scope included:             <ul style="list-style-type: none"> <li>• Manufacturing Procedure Specification</li> <li>• Inspection and Test Plan</li> <li>• Feedstock qualification</li> <li>• Test/retest sampling locations</li> </ul> </li> </ul>	

## Feedstock Qualification

- Test unit definition expanded to include hot rolling practice
- For pipe with delivery condition M: An initial on-site technical audit of the coil/plate mill and periodic on-site or remote confirmation that the coil/plate rolling practice continues to achieve the planned results
  - Coil/plate rolling practice validation criteria shall be verified as part of the audit
- Steel mill/rolling mill shall have quality management system in accordance with ISO 9001 or equivalent and be registered
- MTRs to include slab, coil/plate, and pipe manufacturer name and facility
- Variability of strength within coil/plate to be characterized
- Rolling practice deviations to be qualified (separate test units)

## Tensile Test Locations

- Tensile sampling and flattening procedures to be documented
- Tensile retesting protocols expanded to include testing of adjacent locations
  - Applies to TMCP steels in grades X65 or higher
  - Recognizes rolling conditions (not just heat chemistry) can strongly affect properties
  - Retest locations chosen to bracket non-conforming part of coil/plate
  - Requires traceability of pipes to mother coil/plate or retesting of all pipes in test unit

## MPS/MPQT/ITP

- Manufacturing Procedure Specification (MPS) - describes the main characteristics of the manufacturing process that will be applied to a specific order of pipe.
  - Manufacturing Procedure Qualification Test (MPQT) - describes testing of initial production to qualify the MPS.
  - Inspection and Test Plan (ITP) – describes inspection activities, calibration requirements, responsible party, acceptance criteria
- MPS/MPQT/ITP in optional Annex B with content by agreement
    - MPS/MPQT/ITP commonly applied to pipe orders for major projects by many users
    - Existing MPS/MPQT format in current edition of 5L is brief and does not include all the details commonly requested by pipe purchasers
    - ITP not included in current edition of 5L
    - Enhanced MPS/MPQT/ITP with additional detail will benefit manufacturers and customers by promoting a common industry-wide format that meets industry needs

## Features of Enhanced MPS

- Locations/equipment process descriptions
- Steelmaking & casting: chemistry ranges, segregation control, hydrogen control
- Hot rolling: temperature/time tolerances, plate/coil inspection, dimensional and mechanical property control, cropping, secondary processing
- Pipe manufacture: forming, welding procedure specification, seam heat treatment
- Heat treatment process controls
- Test/retest locations
- Rework/retest/release controls for non-conformances to manufacturer's practices
- Product identification and traceability practices
- Storage, handling, loading and shipping practices

### Features of Enhanced MPQT

- All production tests performed as part of qualification
- Weld procedure qualification
  - HFW: welding process controls, mechanical test results, verification of seam heat treatment by metallography, hardness tests if applicable
  - SAW/COW: bevel dimensions, wire/flux, welding parameters, mechanical test results, hardness tests if applicable, chemistry
- Assessment of coil/plate tensile property variability and coil/plate to pipe strength changes
- Requalification – approval by purchaser and notification of requalified coil/plate/pipe
- Other data requested by purchaser

### Features of ITP

- Tests performed
- Test frequency
- Calibration
- Party responsible for activity (manufacturer, third party, ...)
- Acceptance criteria
- Results recording
- Witness and hold points

## Marking of Multiple Grades

- Ballot passed with editorial changes to clause

11.4.1 Marking of pipe to multiple grades is permitted only by agreement between the purchaser and the manufacturer within the following limits:

- Pipe may have multiple markings with in the following grade ranges:
  - $\leq$  L290 (X42)
  - $>$  L290 (X42) to  $<$  L415 (X60)
  - For L415 (X60) and above, each grade is marked individually
- Pipe shall be marked to only one PSL level

## cont. Marking of Multiple Grades

- 11.4.2 *The manufacturer is responsible to assure that the pipe conforms to all requirements of each of the certified grades. This allows pipe to be used as any of the grades individually.*
- 11.4.3 *Where pipe is marked to multiple grades, a single inspection document shall be issued referencing the grade combination as marked on the pipe. The inspection document may contain a specific statement that pipe conforms to each grade individually.*
- 11.4.4 *After delivery of the pipe, no re-marking or re-certification of the pipe to a different grade shall be permitted.*

## Status of Revisions

- Addendum 2 ballot closed May 12, passed with some negative votes
- Comments were discussed and resolved at 2010 Exploration & Production Standards Conference on Oilfield Equipment and Materials, Washington DC, week of June 27
- Some required rebalot of changes - expected 3<sup>rd</sup> quarter, 2010
- Approved changes to be published in Addendum 3 in 4<sup>th</sup> quarter, 2010

## Concluding Remarks

- Revisions to 5L will strengthen requirements to ensure quality, reduce potential for non-conforming pipe and provide improved tools for communication between manufacturer and purchaser
- Standards are not a substitute for good engineering
  - Standards reflect common requirements for most applications
  - Specific applications may require supplementary requirements
  - Standards are not a complete recipe for manufacturing or purchasing pipe
  - Qualified personnel are needed to ensure that pipes and pipelines perform as intended



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You may find the addendum and errata that are applicable to API 5L at:

<http://www.api.org/Standards/addenda/add-ep.cfm>

QUESTIONS ?