

**TRANSCANADA KEYSTONE PIPELINE, LP
KEYSTONE XL PIPELINE PROJECT
PRESIDENTIAL PERMIT APPLICATION
EXHIBIT C**

Pipeline Specification

The following summarizes pipeline specifications for the Keystone XL Pipeline Project.

1.0 DESIGN FORMULA

The design parameters for steel pipe shall be determined in accordance with the following equation: (See 49 CFR 195.106-Internal Design Pressure)

$$P = 2St/D \times F \times E$$

where:

- P = Internal Design Pressure, psig
- S = Specified minimum yield strength, psi
- D = Nominal outside diameter of the pipe, inches
- t = Specified wall thickness of the pipe, inches
- F = Design Factor
- E = Seam joint factor

2.0 DESIGN FACTOR DETERMINATION

The design factor (F) will be determined as a result of conditions or a combination of conditions such as crossings, fabrications, station piping, and special areas.

2.1 Mainline and Facilities

The pipeline will be designed consistent with the 57 Special Conditions included in the Department of State's August 26, 2011 Final Environmental Impact Statement (FEIS) for the Keystone XL Pipeline Project (Appendix C to FEIS) and to specifications sufficient to support a potential future application for a special permit from the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) to operate at a higher pressure and greater throughput than would otherwise obtain under the current PHMSA regulations.

The design factor of 0.8 will be used for the mainline in all areas where normal installation methods and cross country conditions prevail with exceptions to areas as stipulated in the PHMSA Special Condition #14 with a reduced operating pressure equivalent to a maximum 0.72 design factor such as pump station and intermediate mainline valve facilities.

2.2 Crossings

Though a lower design factor is not specified by 49 CFR Part 195 or the PHMSA Special Permit for selected crossings and fabricated assemblies, a

conservative design practice is applied. Pipe installed at all highway crossings, bored road and cased rail road crossings shall be design to equate to a 0.60 design factor. Directionally drilled crossings, and uncased railroad crossings shall be designed using a design factor of 0.50.

3.0. LINE PIPE REQUIREMENTS

Line pipe for the Keystone XL Project shall be double submerged arc welded in accordance with API 5L Steel Pipe, 44th Edition

New steel pipe for the mainline shall be mill inspected by an authorized TransCanada inspector and mill tested to API specification requirements, and Company specifications.

If shipped by rail, the shipment shall be made in accordance with API Recommended Practice 5L1 specification latest edition, if shipped by barge or marine transport, the shipment must be in accordance with API Recommended Practice 5LW.

4.0 MINIMUM WALL THICKNESS AND YIELD STRENGHT

Mainline pipe nominal wall thickness (w.t.) will be determined by the design formula, included in Section 1.0:

The pipeline will operate at a Maximum Operating Pressure of 1308 psig with an operating specified minimum yield strength up to 72 percent. Nonetheless, as noted, the pipeline will be designed to specifications sufficient to support a potential future application for a special permit at a Maximum Operating Pressure of 1440psig. Accordingly, the design will reflect the following minimum wall thicknesses:

36" O.D. x 0.465" w.t., API 5LPSL2 X-70M (0.80 design factor)
36" O.D. x 0.515" w.t., API 5LPSL2 X-70M (0.72 design factor)
36" O.D. x 0.618" w.t., API 5LPSL2 X-70M (0.60 design factor)
36" O.D. x 0.748" w.t., API 5LPSL2 X-70M (0.50 design factor)

Design Pressure of 1600 psig at locations downstream of pump stations where the elevation is lower than the station:

36" O.D. x 0.572" w.t., API 5LPSL2 X-70M (0.72design factor)

5.0 PIPE WALL THICKNESS TRANSITIONS

End preparation will be done in accordance with API 1104 20th Edition.

6.0 MINIMUM PIPE LENGTH

Minimum pipe length to be installed on pipeline construction will be five (5) feet. This does not apply to fabricated assemblies or transition pieces.

7.0 PIPE BENDING

The U.S. portion of the Keystone pipeline will utilize both field bending and 3D forged fittings in the construction of the pipeline. The pipeline will allow for 100% passage of in-inspection tools.

8.0 COATING CONSIDERATIONS

A. Below Ground Piping

The primary coating for the exterior surface of below ground line pipe shall be fusion bonded epoxy (FBE) with a nominal 16 mil thickness and with a minimum five inch (5") coating cutback at each end of the pipe joint. Welded field joints shall be protected with two part liquid epoxy. Internal coating is not required for this project. Line pipe installed in a bored or directional drill crossing shall be coated with FBE and an over coat of abrasion resistant coating.

Line pipe installed in marshes and wetlands subject to flooding for extended periods of time and beneath uncased drainage canals and ditches, and rivers and streams installed by the open-cut method will be externally coated over FBE coating with reinforced concrete, concrete weights or geotextile bag weights installed to provide the pipe with a minimum specific gravity of 1.10 in fresh water.

B. Above Ground Piping

All above grade, uncoated piping and appurtenances shall be sandblasted clean, primed and painted in accordance with Keystone painting specifications. Colors shall be specified by Keystone.