Pipeline Inspections

Corrosion Control Incorporated provides API-570 pipeline inspection services for above and below grade piping. Our API certified inspectors each have more than 20 years of experience assessing pipeline systems. Our firm specializes in providing piping inspection services within petroleum marketing terminals, power generation plants, and on DESC military fueling systems.

Our engineers follow the inspection methods set forth in the API-570 code manual. Above grade piping inspection procedures are set forth in Section 5 of API-570. It is important to note that these procedures were written to address piping inspections in refineries where internal corrosion and erosion are controlling factors. On above grade terminal piping, external corrosion tends to be of the most significant concern, especially on piers and in marine environments. At the start of each project, our inspectors meet with the fuel system operators to obtain background information. Specifically, the pipeline dates of construction, service conditions, operating pressure and leak history will be discussed. Any previous repairs and facility visual inspection procedures will be reviewed. A set of piping drawings, if available, will be retained.

Following the meeting, a visual inspection of the pipe routes will be made. The inspector will be looking for leaks, dents, damaged supports, gaps between the pipe and supports, misalignments and corrosion staining. A diagram of the pipe segments will be prepared with locations of turns, valves, supports, weld seams and anomalies noted. It is likely that the fuel piping has never been inspected to API-570 code. In addition, original construction inspection records to ASME B-31.3 are likely not available. Therefore, the present inspection must also confirm that the individual pipeline segments are of relatively uniform thickness and of the proper schedule.

The Inspector will establish Thickness Measurement Locations (TML's) along the pipelines. At least one (1) TML will be established on each run of piping. Each TML will consist of four (4) test points at equal spacing around the pipe, with one point always being on the bottom of the pipe. Additional TML’s will be established based on the visual inspection findings, and in areas of expected erosion or water entrapment. At each test point, an ultrasonic measurement shall be recorded. If external corrosion is observed, depths of metal loss shall be measured with a pit depth gauge.
Flanges and valves shall be inspected to ensure they have ASTM marks, and are of the correct type and rating. Bolts will be inspected for full thread engagement, stretching and corrosion. The body of valves shall be inspected using spot ultra-sonic measurements.

The pipe risers at the soil interface without paving will be excavated to a point 12 inches below grade per API-570 – 5.3.4. The pipe will be inspected for metal loss from 12 inches below grade to 6 inches above grade. The condition and type of coating will be noted.

If any internal metal loss is detected, additional TML’s will be established in the area to define the extent of the corrosion.

During the inspection, the condition of the external coating shall be noted. Coating thickness measurement readings shall be recorded on each pipe run.

If any repairs have been made to the pipelines, they shall be examined to ensure they meet code. In the event that a temporary repair has been in service long term, the operator will be consulted to determine if a Pipe Engineer has authorized this action.

The below grade piping will be evaluated in accordance with API-570 section 9. First, the inspector will electronically trace out the route of the pipes, placing marks on 100 foot intervals. The inspector will then visually inspect the surface soil along the pipe route for indication of possible leaks per API-570 – 9.1.1. The inspector will determine what type of cathodic protection system is afforded the underground piping. The condition of any rectifier units, test stations, anode boxes and dielectric flanges will be noted. A potential profile will then be obtained along the pipeline per API-570 – 9.1.2. This data will determine if there are areas of active corrosion along the piping. The data will be graphed in the field and reviewed for areas of active corrosion.
Once the cathodic protection readings have been obtained, the coatings condition on the underground piping will be determined per API-570 – 9.1.3. First, a current mapper transmitter will be connected to the pipeline. Using the current mapper, depth of cover and current attenuation readings will be recorded on 100 foot centers. The current mapper will then be connected to an ACVG harness, and the transmitter signal will be changed. ACVG readings will then be recorded on 25 to 50 foot centers, with indication points noted. The ACVG harness will then be used to detect the exact location of each indication. A side voltage gradient reading will be obtained at each coating flaw indication to determine its relative size.

The cathodic protection and ACVG data will then be compared. Areas of inadequate cathodic protection coinciding with a coating flaw will be marked for excavation. If there are no areas of low cathodic protection levels, or all areas have active corrosion, the indications with the highest magnitude will be marked for excavation.

A representative number of coating defects are selected, based on the length of the piping, and the field test results. The selected coating defect locations will be marked with white biodegradable paint, and wooden stakes. Diagrams of the proposed excavation sites are then produced, and dig permits are requested. Once the dig permits or utility clearances are received, the pipes will be carefully excavated, with the last 12 inches of soil removed using hand tools. At least 10 feet of pipe will be exposed within each excavation. The inspector will examine the exposed pipe for coating quality and corrosion.

Any areas of corrosion will be cleaned to bare metal. Pit depth readings will then be obtained. Representative UT readings will also be recorded. The exposed pipe coatings will be repaired prior to backfilling. The excavation holes will be backfilled and compacted. The soil surface will be reseeded.

It is not uncommon to find buried flanges, old repairs, third party damage and poor construction practices, when the pipes are examined.
Where piping is inaccessible for inspections, such as under supports, within dikes, in casings, and under pavement, LRGW tests are conducted. This inspection involves the introduction of ultrasonic longitudinal waves into the wall of the pipe. Corrosion losses and mechanical damage are detected in the return signal. Through calibration using known anomalies, damage can be accurately assessed on the inaccessible sections of the pipe. The tests can also locate buried fittings and dents.

The inspector will prepare a comprehensive report fully documenting all of the field observations and findings. The report will include tabulated data, site maps noting inspection locations, analysis of the data, calculated corrosion rates, maximum allowable operating pressures, and remaining safe service life. Any deficiencies or code non-conformance shall be fully described to allow permanent repairs to be made. Any cited deficiencies and recommended repairs must be justified by the field data and identifiable code. The report will be signed by our inspector.

If you are interested in documenting the condition of your piping, just send an email to our firm describing the pipelines to be evaluated. Include diameters, lengths above and below grade, type of cover (soil or paved) on below grade lines and the location of your facility. Our engineers will promptly respond with a technical proposal and fee schedule.