



Designation: D8555 – 24

Standard Practice for Conducting a Coating/Lining Detachment Acoustical Sounding (Tapping) Inspection¹

This standard is issued under the fixed designation D8555; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers a method for conducting a qualitative acoustical sounding inspection by lightly tapping newly-applied and previously installed coating/lining systems with a hand-held tool to assess potential detachment from the substrate, prior to visible disbondment. A procedure is prescribed to help ensure reproducibility of the respective sounding methodology. Interpretation of the sound is qualitative and typically requires basic training, for example, the degree of tapping force to use and what to listen for, consistent with the generic type of protective coating or lining system being evaluated.

1.2 High performance coating and lining systems (independent of thickness) can be evaluated for sounding using the tap test, provided excessive tap force that may result in impact damage to otherwise acceptable, sound coatings is avoided.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D3359 Test Methods for Rating Adhesion by Tape Test](#)

[D4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers](#)

[D6677 Test Method for Evaluating Adhesion by Knife](#)

[D7234 Test Method for Pull-Off Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *acoustical sounding inspection, n*—tapping lightly on an installed coating/lining system using a non-sound dampening tool to detect differences in reflective sound that may be an indication of detachment from the substrate.

4. Summary of Practice

4.1 The installed coating/lining system is lightly tapped with a non-sound dampening tool in multiple locations in the area(s) of interest. The technician listens for a change in the sound generated by the tapping. Upon detection of a change in sound (that is, from a sharp, crisp tap sound to a duller or softer tap sound), concentrated tapping in that location is performed to define the extent of area producing the duller or softer tap sound and the area subsequently demarcated. The duller/softened sound created by the tapping may be an indication of coating and lining detachment from the substrate that may not be visibly evident, and may be subject to further investigation, including destructive testing.

5. Significance and Use

5.1 Coating condition assessments are based, in large part, on visual observation of defects in or damage to the coating/lining system. The visual observation process also identifies precursors of defects (discoloration, cracking, etc.). Such visual inspections may be augmented with destructive adhesion testing on a case-by-case basis. Acoustical sounding (tap testing) provides a non-destructive alternative to destructive testing to quickly identify areas of potential coating/lining film detachment for more intrusive examination, since poor adhesion to the substrate may not be visually evident.

5.2 Areas of suspect coating or lining adhesion revealed by the tap test may be overlooked during normal visual observation until visual indicators of failure (for example, blisters, cracks, peeling, or the presence of corrosion) become evident. Acoustical sounding can be a predictive go/no examination, in that it provides indication of a reduced bond between the

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

coating/lining system and the substrate before disbonding becomes visually evident.

5.3 Acoustical sounding inspection is particularly useful when assessing the condition of immersion service linings that may be covered with corrosion product, staining, or other tenacious deposits that obscure small defects (**Note 1**). High performance coatings and linings can also visually mask disbondment and under-film corrosion due to high cohesive strength.

5.4 Although the use of acoustical sounding (tapping) to determine potential coating detachment is relatively simple, the extent of the noted detachment is subject to the inspector's interpretation of the tonal differences in the produced sound. Likewise, areas with high levels of ambient background noise make tonal differences of the produced sounds difficult to distinguish. Furthermore, data recording must be done manually using sketches and photographs.

NOTE 1—For best results, the coating or lining should be cleaned prior to or in combination with acoustical sounding, as effective use of tap testing should include a concurrent visual examination.

6. Apparatus

6.1 A light weight, hand-held tool is used to tap the coated/lined substrate. Several types of tools may be used, for example, the handle of a scraper, putty knife, wood chisel, or 5-in-1 tool, screwdriver handle, small tack hammer, small drift punch, etc. The tool material must not dampen the sound, for example, a tool containing a wood or rubber handle, or a rubber mallet, would be a poor selection.

6.1.1 Any sharp edges of tool surfaces that may contact the coating/lining must be removed. The mass of the tool shall be relatively small to prevent impact damage to the coating/lining being sounded.

6.1.2 Supplemental electronic instrumentation that measures the duration of contact between the tapping head and the coating may be used as necessary.

7. Procedure

7.1 Select areas of coating/lining to be evaluated. Areas of interest may include: (1) on and adjacent to the transition from pipe wall to flange face; (2) areas adjacent to changes in geometries; (3) on and adjacent to welds; (4) on and adjacent to waterline areas of a storage tank lining; and (5) adjacent to or in the vicinity of visual indication of coating or lining degradation.

7.1.1 Areas of interest should be cleaned prior to or in combination with acoustical sounding, as effective use of tap testing includes a concurrent visual examination of the coating/lining surfaces.

7.2 Tap the coating or lining surface with the tool selected in 6.1 using a rapidly applied light force to generate a tapping sound. Tap the coating/lining in multiple locations in the area(s) of interest, listening for a change in sound generated by the tapping (**Note 2** and **Note 3**).

NOTE 2—Ambient noise can interfere with the ability to hear differences in the reflective sound from tapping.

NOTE 3—Avoid using excessive tap force to prevent impact damage to otherwise sound coatings or linings.

7.3 Upon detection of a change to a duller or softer tap sound, concentrate tapping in that location to define the extent of area exhibiting the duller or softer tap sound. Mark the suspect areas for subsequent destructive examination as required.

7.4 Note the presence of any other visual indications of potential degraded coating/lining in the area(s) of interest, for example, movement of the coating when tapped, blistering, cracking at the edge of the area, corrosion products, perforation of coating, etc.

7.5 Suspect areas revealed by the acoustical sounding inspection should be further investigated using destructive testing as appropriate, and may include adhesion testing according to Test Methods **D3359**, **D6677**, **D7234**, or **D4541**, or combinations thereof. The investigation method and extent can be based upon historical performance of the coating or lining system, component service environment and history, criticality of the component and coating integrity, planned frequency of coating condition assessments and subsequent maintenance, etc.

8. Report

8.1 The following information shall be documented and reported:

- 8.1.1 A description of the tool used to perform the sounding test,
- 8.1.2 The location(s) tested,
- 8.1.3 Date of the assessment, and
- 8.1.4 Location(s) of the areas that have suspect adhesion.

9. Keywords

9.1 acoustical sounding inspection; coating detachment testing; tap test

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