



## Test Monitoring Center

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L-37 Information Letter 11-1  
Sequence Number 41  
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***ASTM consensus has not been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.***

TO: L-37 Mailing List

SUBJECT: 1. New Printing of "Photographs for Gear Distress"  
2. Renaming of Rating Manual 21  
3. Coordination of Rater Training

During a September 10, 2010 teleconference, the L37 Surveillance Panel approved for use a new printing of the L37 gear distress photographic rating scale. The panel agreed to require use of scales from this new printing 30 days after the photos are available for purchase from ASTM.

The photos are now available for purchase from ASTM as "Photographs for Gear Distress". The stock number for this item is: TMCGEARDISTRESS2010PR. Use of scales from this printing is mandatory for all L37 tests ending on or after April 30, 2011. Section 12.2.1 of the procedure will be updated to reflect this requirement.

In addition, ASTM has assumed responsibility for rating manual 21. Consequently, the name of that manual has been changed to: ASTM Distress Rating Manual 21 (Formerly CRC Manual 21). And CRC responsibility for the coordination of rater training has been transferred to the Test Monitoring Center necessitating a change to footnote 16.

The revised Sections of D6121 are shown on the following pages.

Galen Greene  
Chairman  
L-37 Surveillance Panel

Frank Farber  
Administrator  
ASTM Test Monitoring Center

Attachment

cc: [ftp://ftp.astmtmc.cmu.edu/docs/gear/l37/procedure\\_and\\_ils/il11-1.pdf](ftp://ftp.astmtmc.cmu.edu/docs/gear/l37/procedure_and_ils/il11-1.pdf)

Distribution: Email

(Revises Test Method D 6121-10)

**3.1.1** abrasive wear, n—on ring and pinion gears, removal of material from the operating surface of the gear caused by lapping of mating surfaces by fine particles suspended in lubricant, fuel, or air or imbedded in a surface. ASTM Distress Rating Manual 21

Note 1: ASTM Distress Rating Manual 21 was formerly titled CRC Manual 21. Renumber subsequent notes accordingly.

**3.1.2** adhesive wear, n—on ring and pinion gears, removal of material from the operating surface of the gear caused by shearing of junctions formed between operating surfaces in direct metal-to-metal contact; sheared-off particles either remain affixed to the harder of the mating surfaces or act as wear particles between the surfaces. ASTM Distress Rating Manual 21

**3.1.3** burnish, n—on ring and pinion gears, an alteration of the original manufactured surface to a dull or brightly polished condition. ASTM Distress Rating Manual 21

**3.1.4** chipping, n—on ring and pinion gears, a condition caused in the manufacturing process in which a small irregular cavity is present only at the face/crown edge interface. The edge-chipping phenomenon occurs when sufficient fatigue cycles accumulate after tooth surface wear relieves the compressive residual stress on the tooth profile side of the profile-to-topland interface. Chipping within 1 mm of the face/crown edge interface is to be called chipping, not pitting/ spalling. ASTM Distress Rating Manual 21

**3.1.5** corrosion, n—in final drive axles, a general alteration of the finished surfaces of bearings or gears by discoloration, accompanied by roughening not attributable to mechanical action. ASTM Distress Rating Manual 21

**3.1.6** deposits, n—in final drive axles, material of pasty, gummy, or brittle nature adhering to or collecting around any of the working parts. ASTM Distress Rating Manual 21

**3.1.7** discoloration, n—on ring and pinion gears, any alteration in the normal color of finished steel surfaces. ASTM Distress Rating Manual 21

**3.1.8** pitting, n—on ring and pinion gears, small irregular cavities in the tooth surface, resulting from the breaking out of small areas of surface metal. ASTM Distress Rating Manual 21

**3.1.9** ridging, n—on ring and pinion gears, an alteration of the tooth surface to give a series of parallel raised and polished ridges running diagonally in the direction of sliding motion, either partially or completely across the tooth surfaces of gears. ASTM Distress Rating Manual 21

**3.1.10** rippling, n—on ring and pinion gears, an alteration of the tooth surface to give an appearance of a more or less regular pattern resembling ripples on water or fish scales. ASTM Distress Rating Manual 21

**3.1.11** scoring, n—on ring and pinion gears, the rapid removal of metal from the tooth surfaces caused by the tearing out of small contacting particles that have welded together as a result of metal-to-metal contact. The scored surface is characterized by a matte or dull finish. ASTM Distress Rating Manual 21

**3.1.12** scratching, n—on ring and pinion gears, an alteration of the tooth surface in the form of irregular scratches, of random length, across the tooth

surface in the direction of sliding of the surfaces. ASTM Distress Rating Manual 21

**3.1.13** spalling, n—on ring and pinion gears, the breaking out of flakes of irregular area of the tooth surface, a condition more extensive than pitting. ASTM Distress Rating Manual 21

**3.1.15** wear, n—on ring and pinion gears, the removal of metal, without evidence of surface fatigue or adhesive wear, resulting in partial or complete elimination of tool or grinding marks or development of a discernible shoulder ridge at the bottom of the contact area near the root or at the toe or heel end of pinion tooth contact area (abrasive wear). ASTM Distress Rating Manual 21

**12.1** Pinion Bearing Rating—Examine the bearings for wear, surface fatigue corrosion, and deposits in accordance with ASTM Distress Rating Manual 21.

**12.2.1** Examine the tooth surfaces on the drive side of the pinion and ring gear for the following distresses in accordance with ASTM Distress Rating Manual 21 (Formerly CRC Manual 21) and Annex A9: burnishing, wear, pitting/spalling, ridging, rippling, scoring, discoloration, corrosion, and deposits. Rate the distress types of wear, rippling, and ridging using the ASTM Photographs for Gear Distress. The photographs shall be ASTM item number: TMCGEARDISTRESS2010PR and shall have been issued on or after November 9, 2010.

<sup>16</sup> Training for individuals rating gear sets for gear distress level may be coordinated through the ASTM Test Monitoring Center, 6555 Penn Avenue, Pittsburgh, PA, 15206.

**A9.1** Additional descriptions have been developed to aid the rater in accurately assessing the distress on the ring gear and pinion following the completion of the test. The definitions described in this annex supersede those found in ASTM Distress Rating Manual 21 where applicable.

**A9.2.1** Document the most severe level for each individual distress. Use the photographs in ASTM Distress Rating Manual 21 as examples.

**A9.3** Severity levels applied to distress types. When rating the following distresses types, the definitions described supersede those found in ASTM Distress Rating Manual 21.

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Use for Pitting/Spalling Distress Only

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Numerical Value	Level of Distress	Corresponding Manual 21 Spalling Scale
10.0	None	
9.9	Trace Pitting—Pit size up to 0.24 mm diameter	
9.8	Trace-Light Pitting	
9.7	Light Pitting—Pit size 0.50 mm diameter	
9.6	Light-Medium Pitting	
9.5	Medium Pitting—Pit size 0.74 mm diameter	
9.4	Medium-Heavy Pitting	
9.3	Heavy Pitting—Pit size 0.98 mm diameter	
9.0	Trace Spalling	1 mm <sup>2</sup>
8.0	Trace-Light Spalling	4 mm <sup>2</sup>
7.0	Light Spalling	9 mm <sup>2</sup>
6.0	Light-Medium Spalling	16 mm <sup>2</sup>
5.0	Medium Spalling	25 mm <sup>2</sup>
4.0	Medium-Heavy Spalling	36 mm <sup>2</sup>
3.0	Heavy Spalling	49 mm <sup>2</sup>
2.0	Heavy to Catastrophic (up to 50 % of gear tooth contact area and for pitting/spalling, greater than a 3.0 on the spalling template)	
1.0	Heavy to Catastrophic (greater than 50 % and less than 100 % of the gear tooth contact area not ratable)	
0.0	Catastrophic (100 % of the gear tooth contact area not ratable)	

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Spalling in the range from 9.0 to 3.0 references ASTM Distress Rating Manual 21 Spalling Template. Any tooth breakage will be noted in the comment section of the final test report.

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