



## Test Monitoring Center

@ Carnegie Mellon University  
6555 Penn Avenue, Pittsburgh, PA 15206, USA

<http://astmtmc.cmu.edu>  
412-365-1000

Ball Rust Test Information Letter No. 18-1  
Sequence No. 4  
July 25, 2018

*ASTM consensus has not yet been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.*

TO: Ball Rust Test Mailing List  
SUBJECT: Introduction of New Image Analysis Systems

After numerous teleconferences, discussions, and revisions, the Ball Rust Test Surveillance Panel finalized introduction of two new Image Analysis Systems for use in the Ball Rust Test. These changes are effective the date of this information letter.

The updated sections of ASTM Test Method D6557 are attached.

Jessica Villarreal  
Chairperson  
Ball Rust Test Surveillance Panel

Frank M. Farber  
Director  
ASTM Test Monitoring Center

Attachment

c: [ftp://ftp.astmtmc.cmu.edu/docs/bench/brt/procedure\\_and\\_ils/brt/il18-01.pdf](ftp://ftp.astmtmc.cmu.edu/docs/bench/brt/procedure_and_ils/brt/il18-01.pdf)

Distribution: Email

6.8 *Image Analysis System*—A specific imaging analysis system<sup>7,10</sup> is required. Three image analysis systems are approved for use in this test: Generation 1 (Gen 1), Generation 2 (Gen 2), and a hybrid of these two systems Generation 2H (Gen 2H). This hybrid system is composed of the equipment described in 6.8.1.1 through 6.8.1.20, 6.8.2.4 through 6.8.2.6, and 6.8.3.3 through 6.8.3.4.

6.8.1 *Optics and Illumination* – The required optics and illumination equipment are shown below. The Gen 1 and Gen 2H system components are described in 6.8.1.1 through 6.8.1.20. The Gen 2 system components are described in 6.8.1.21 through 6.8.1.33.

- 6.8.1.1 Nikon Epiphot 200 inverted metallurgical microscope,
- 6.8.1.2 BZ binocular head,
- 6.8.1.3 RV 3 plate mechanical stage,
- 6.8.1.4 CFWN 10× wide field eyepiece, high point eyepiece,
- 6.8.1.5 Manual BD 5 place nosepiece,
- 6.8.1.6 Epiphot 300 EB block,
- 6.8.1.7 DF module,
- 6.8.1.8 CF BD plan 5×/0.13 plan achromat objective,
- 6.8.1.9 CF BD plan 10×/0.13 plan achromat objective,
- 6.8.1.10 EPI polarizer,
- 6.8.1.11 Analyzer,
- 6.8.1.12 Lamphouse for 12 V/100 W quartz halogen light source,
- 6.8.1.13 Lamphouse adapter,
- 6.8.1.14 12 V/100 W halogen bulbs,
- 6.8.1.15 300/200 100 W power supply,
- 6.8.1.16 Remote control cable,
- 6.8.1.17 C-mount coupler for video camera,
- 6.8.1.18 NCB 11 filter,
- 6.8.1.19 Power cords, and
- 6.8.1.20 Ultracentrifuge tube spacer with a 5 mm hole drilled in the center (used as a sample holder and sample randomizer for sample orientation).
- 6.8.1.21 Inverted Metallurgical Microscope Nikon ECLIPSE MA200
- 6.8.1.22 C-TB Binocular Tube
- 6.8.1.23 MA2-SR Rectangular Stage (with standard holder)
- 6.8.1.24 CFI 10X EYEPIECE F.N. 22MM-NC (2 units)
- 6.8.1.25 LV-NBD5-CH Epi BD 5 Place Nosepiece ESD
- 6.8.1.26 CFI TU Plan FLUOR BD 5X (NA=0.15mm / WD=18.0mm)
- 6.8.1.27 CFI TU Plan FLUOR BD 10X (NA=0.30mm / WD=15.0mm)
- 6.8.1.28 MA2-PA Polarizing Filter Cube
- 6.8.1.29 LV-LH50PC Precentered Lamphouse
- 6.8.1.30 LV-HL50W 12V50W Halogen Lamp
- 6.8.1.31 LV-TV Tube adapter
- 6.8.1.32 Power Cord
- 6.8.1.33 Ultracentrifuge tube spacer with a 5 mm hole drilled in the center (used as a sample holder and sample randomizer for sample orientation).

6.8.2 *Image Capture Hardware and Software* – The required image capture hardware and software are shown below. The Gen 1 system components are described in 6.8.2.1 through 6.8.2.3. The Gen 2 and Gen 2H system components are described in 6.8.2.4 through 6.8.2.6.

- 6.8.2.1 Research grade, high resolution, NTSC RGB/RS-170 camera system,
- 6.8.2.2 Research grade, high resolution, NTSC RGB/RS-170 frame grabber,
- 6.8.2.3 The host computer system shall meet or exceed the following specifications:
  - Hardware:* Pentium 133 MHz CPU, 16 MB RAM, 540 MB hard drive, 1.44 MB 90 mm floppy, 1.44 MB 130 mm floppy (optional), CD-ROM (highly recommended option), 101 or

Windows 95 keyboard, SVGA local bus video card with 2 MB RAM (4 MB recommended), 2 button serial mouse with pad, 2 parallel ports, and 2 serial ports.

*Software* : Windows 3.x/DOS 6.22 or Windows 95 Operating System, Microsoft Excel 7.0 (Microsoft Office 97 recommended).

*Monitor:* Medical grade high-resolution NTSC RGB color video monitor (483 mm; (19 in.) diagonal, minimum), all necessary cables, connectors, and adapters (including a surge and spike suppressing power strip).

6.8.2.4 Research grade, high resolution camera system, OPTRONICS MICROCAST

6.8.2.5 DP-Axeon-PCI -- Axeon 32MB PCI Video Capture kit

6.8.2.6 The host computer system shall meet or exceed the following specifications:

*Hardware:* 2.1 gigahertz (GHz) or faster 64-bit (x64) processor, 4 gigabyte (GB) RAM (64-bit), 40 GB available hard disk space (64-bit), DirectX 9 graphics device with WDDM 1.0 or higher driver, Keyboard, Mouse, and Computer Monitor (1280 x 1024 resolution or greater – Min VERT RES = 1024).

*Software* : Microsoft Windows 7 Pro (or Ultimate) – 64-bit, Microsoft Excel 2010.

*Secondary Monitor (for Camera):* Sony LMD-2030MDW.

6.8.3 *BRT Image Analysis Software* – The required BRT image analysis software for each system is shown below. The Gen 1 system components are described in 6.8.3.1 through 6.8.3.2. The Gen 2 and Gen 2H system components are described in 6.8.3.3 through 6.8.3.4.

6.8.3.1 BRT macro program, and

6.8.3.2 Optimate image analysis engine.

6.8.3.3 Meyer Instruments BRTGEN2.EXE, and

6.8.3.4 Media Cybernetics IMAGE-PRO PLUS 7 image analysis engine.

11.2 *Prepare Image Analysis System for Rust Evaluation* – Prepare the image analysis system for rust evaluation according to the following directions. Prepare Gen 1 or Gen 2H systems according to 11.2.1 through 11.2.1.7. Prepare Gen 2 systems according to 11.2.2 through 11.2.2.9.

11.2.1 Set the microscope adjustments as follows:

11.2.1.1 Illumination change-over knob B/D—D (dark field).

11.2.1.2 ND16 filter slider—IN (push to first click).

11.2.1.3 A filter slider—IN (push to second click).

11.2.1.4 F (field diaphragm control lever)—OPEN.

11.2.1.5 A (aperture diaphragm control lever)—OPEN.

11.2.1.6 Neutral density filter—ND16.

11.2.1.7 Objective lens—5×.

11.2.2 Set the Nikon ECLIPSE MA200 microscope adjustments as follows:

11.2.2.1 Power = ON

11.2.2.2 Lamp Intensity = INDEX

11.2.2.3 Filter Turrets = OPEN and ND16

11.2.2.4 Aperture Diaphragm = FULL OPEN

11.2.2.5 Field Diaphragm = FULL OPEN

11.2.2.6 Objective = 5X

11.2.2.7 Beam Splitter = OUT (45 % CAMERA / 55 % EYEPIECES)

11.2.2.8 Polarizer / Analyzer = IN and ALIGNED (90 deg from extinction)

11.2.2.9 Bright Field / Dark Field = Out (Engaged)

11.3 *Optronics Controller* – Set The Optronics controller according to the following directions. Prepare a Gen 1 system according to 11.3.1 through 11.3.2. Prepare Gen 2 or Gen 2H systems according to 11.3.3 through 11.3.6.

- 11.3.1 Shutter speed—1/60 + (manual).
- 11.3.2 White balance—ON.
- 11.3.3 Exposure = MANUAL
- 11.3.4 Shutter Speed = 0.0167 s
- 11.3.5 White Balance = AUTO
- 11.3.6 Brightness = 3

11.4 Turn on the Image Analysis Computer and initiate the required software. Prepare a Gen 1 system according to 11.4.1. Prepare Gen 2 or Gen 2H systems according to 11.4.2 through 11.4.3.

11.4.1 Initiate the Optimate software program.

11.4.2 Initiate the *IMAGE-PRO PLUS 7* software program

11.4.3 Initiate the *BRTGEN2.EXE* macro program

*[Section 11.5 is deleted]*