

SPECIFICATIONS FOR STRONG-MOTION ACCELEROGRAPHS & REQUIREMENTS FOR INSTALLATION AND SERVICING

SCOPE:

This Information Bulletin shall apply to any building which contains one or more strong motion accelerographs required by Section 1613.10 of the 2017 Los Angeles Building Code (2017 LABC).

PART I: SPECIFICATIONS

Strong-motion accelerographs must be complete integrated systems, small in size, easily serviced and stable over long periods of time without attention. Recording should be at least equal in quality and accuracy to that of the U.S. Coast and Geodetic Survey's standard strong-motion seismographs which have been in use since 1931.

The following are specifications for digital accelerographs installed in buildings to fulfill requirements of LABC Section 1613.10.

- **United States Geographical Survey (USGS) approved Accelerographs**
- **California Geological Survey (CGS) approved Accelerographs.** (See www.conservation.ca.gov/cgs/smip/documents/systemrqmts-triaxialaccelerograph.pdf)
- **Accelerographs approved by the Department of Building and Safety in accordance with the minimum standards set forth below:**

A. Accelerographs

1. **A minimum of three components** (V, L and T).
2. **Natural frequency** - above 40 cps.
3. **Damping** - approximately 70 percent critical.
4. **Sensitivity** - 4 g (at full scale recording).

B. Recording

1. **Sampling Rate** - A minimum of 200 samples per second.
2. **Time of Recording** - From at least 20 seconds before the ground shaking begins until 30 seconds after the last triggering level motion.
3. **Cycles** - At least 30 separate automatic operations without a necessity of servicing up to the recording capacity of the accelerograph (40 minutes or longer).
4. **Rms Noise** - System noise shall be less than 40 micro-g's measured over 0-80 hz.

C. **Timing**

1. **Accuracy** - Plus or minus 0.2 seconds per 100 minutes.
2. **Type** - Internal plus a provision for external.

D. **Starting**

1. **Method** - Pendulum or other device using earthquake motion as the exciting force.
2. **Level** - 1% G nominal.
3. **Time** - Full operation of the accelerograph within 0.1 seconds after activation by the starting device.
4. **Instrument Interconnection and Communication** - Accelerographs shall be interconnected for common start and common timing. A dial-up telephone line is recommended at the base-level instrument with a connection to the others.

E. **Power**

1. A battery maintained by a trickle charger from AC power and capable of powering the accelerograph for 2 days after loss of power.

PART II: INSTALLATION, SERVICING AND REMOVAL OF ACCELEROGRAPHS

All required strong motion accelerographs shall be serviced and maintained in proper working condition in its building to provide information about the action of a major earthquake. The installation, servicing, and/or removal of the strong motion accelerographs shall only be done by a licensed Accelerograph Maintenance Agency.

A. **Buildings with three strong motion accelerographs**

Three strong motion accelerographs shall be in proper working condition in the building to provide information about the action of a major earthquake in the basement, mid-level, and near the top of the building. This arrangement provides the maximum information to the owner of any damage to the building from a major earthquake.

B. **Existing nonconforming buildings with two strong motion accelerographs**

In the existing nonconforming buildings where two strong motion accelerographs are maintained, one in the basement and one at the top of the building, the one in the basement shall be provided with either a horizontal or vertical triggering device and shall be connected to the strong motion accelerograph in the upper portion of the building.

C. **Existing nonconforming buildings with one strong motion accelerograph**

In the existing nonconforming buildings where one strong motion accelerograph is maintained, shall have the instrument placed at the top of the building. This may either be an existing

building complying with Los Angeles City Ordinance No. 156,995 and originally having only one strong motion accelerograph or where all three instruments were removed and a new strong motion accelerograph was placed in the building. The accelerograph placed in the upper portion of the building shall have a vertical trigger.

D. Vertical Trigger

Strong motion accelerographs placed in the upper portion of the building shall start to record upon a vertical acceleration of 0.01 of gravity.

E. Location and Installation

1. **General** - The preferred locations for the instruments are in small, seldom-used rooms or closets near a column (in a vertically aligned stack), with adequate space to mount the instrument and an approved protective enclosure securely to the floor. The proposed locations shall be marked on the structural and architectural floor plans.
2. **Installation Details** - All instruments shall be installed with the same orientation relative to the building, with the reference or long dimension of the instrument aligned with a major axis of the building.
3. **Installation Details** - All instruments shall be installed with the same orientation relative to the building, with the orientation chosen such that the reference or long dimension of the instrument is aligned with a major axis of the building. The orientation of the instrument shall be clearly marked on the structural plans. The installer shall certify the equipment was oriented as per the structural plans.

F. Record

When film is used for recording, a new film load shall be placed in the accelerograph when the film remaining is less than 1/3 of original load. For digital accelerographs, memory should be copied out and emptied when the amount remaining is less than 1/3 of the original capacity.

G. Retrieval

After a significant earthquake, the office of the CGS, has agreed to collect records from instruments located at the top of buildings, develop the records and deliver high-quality duplicate of those records to the owner and to the Department of Building and Safety. For digital accelerographs that CGS has agreed to monitor, the records will be recovered and processed by CGS and provided to the owner and to the Department of Building and Safety.

The film and digital records not retrieved by the CGS shall be retrieved by a licensed Accelerograph Maintenance Agency. These records shall be delivered to the owner and to the Department of Building and Safety.

H. Service Period

The maximum service interval is one year. If the accelerograph is inoperative at consecutive service inspections because of recurring similar problems, then a reinspection and servicing shall be required at least semi-annually until the problem is corrected. The Accelerograph Maintenance Agency shall determine the shorter period so the accelerograph is continually operative. For digital recorders that meet the specifications of CGS and are provided with a telephone connection, CGS will agree to remotely monitor the instrument status. The maximum service interval shall be four years, with the other repairs made when notified by CGS. If the instrument is repaired when necessary, the annual report required per LABC 1613.10 by the owner to the city, that the instrument is in working condition, will be made by CGS.

I. Refurbishing and Replacement

Where the Accelerograph Maintenance Agency finds that the instrument must be removed from the building for repair, the instrument shall be returned and made operative as soon as possible but in not more than 60 days from the removal date. When all analog equipment is replaced, instruments meeting the specifications listed in Part I of this bulletin shall be used.

J. Battery Inspection

The accelerograph shall be tested with any charge device disconnected from an electric power source.