Load Moment System —SAE J159a

SAE Recommended Practice
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Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

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ϕLOAD MOMENT SYSTEM—SAE J159a

SAE Recommended Practice

Report of Construction and Industrial Machinery Technical Committee approved March 1970 and last revised March 1977. Rationale statement available.

ϕ **1. Scope**—This SAE Recommended Practice applies to mobile cranes when used in lifting crane service which are equipped with load moment devices.

ϕ **2. Purpose**—The purpose of this Recommended Practice is to establish the minimum performance requirements of systems used to warn or indicate to the operator or other responsible persons, when the load being lifted approaches and meets the rated load value on the applicable load rating chart of the crane.

ϕ **3. Definitions**

3.1 Load Moment System—A system consisting of devices which, when applied to a crane, sense crane loading, boom length (telescopic only), boom angle, or functions of these, and which automatically signals when the loading conditions approach, reach, and exceed the rated load values.

3.2 Crane Configuration—The physical arrangement of the crane as prepared for a particular operation in conformance with the manufacturer's operating instructions and load rating chart.

3.3 Actual Load—The weight of the load being hoisted and all additional equipment such as blocks, slings, sensors, etc.

3.4 Rated Load—The load value shown on the applicable load rating chart of the crane for the particular crane configuration, boom length, boom angle, or functions of these variables. For radii outside those shown on the load rating chart, the rated load shall be considered as zero.

4. Minimum Performance Requirements

ϕ **4.1 Limit and Warning Signals**—An audible and/or visual limit signal shall be activated at 100% of rated load and also whenever the radius shall fall outside the limits of the crane's load rating chart. The limit signal shall continue to function as long as the load is at or in excess of 100% of rated load, or as long as the radius is outside the limits of the crane's load rating chart.

An audible and/or visual warning signal, readily distinguishable from the limit signal, shall be activated as the rated load is approached. This warning signal shall be activated at not more than 90% of the load at which the 100% limit signal is activated.

Audible signals shall be clearly distinguishable to the operator above the noise of the engines and machinery. Visual signals shall be clearly visible to the operator. Their location shall not create an operational hazard.

ϕ **4.2 System Capacity**—The load moment system capacity shall be either:

a) compatible with the maximum capacity of the crane as specified by the crane manufacturer; or,

b) compatible with the maximum allowable lift for a specific crane configuration of lesser capacity as specified by the user.

4.3 Accuracy—The load moment system shall meet the following accuracy requirements.

4.3.1 Limit Signal Actuation—The actual load which activates the limit signal shall be within 90%–105% of the rated load for the given corresponding radius/angle.

4.3.2 Warning Signal Actuation—The actual load which activates the warning signal shall be no greater than 90% of the actual load which activates the limit signal.

ϕ **4.4 Additional Functions**—When load, radius or angle are displayed as additional functions of the load moment system, the displayed function shall conform to the following:

4.4.1 Load—When load indication is displayed as an additional function of the load moment system, its accuracy shall be in accordance with SAE J376a.

4.4.2 Radius—When radius indication is displayed as an additional function of the load moment system, its accuracy shall be in accordance with SAE J375a.

4.4.3 Angle—When angle indication is displayed as an additional function of the load moment system, its accuracy shall be in accordance with SAE J375a.

ϕ **4.5 Temperature Effect**—Specified accuracy shall be maintained over ambient temperature variations of -30–50° C (-22–122° F) without external adjustment.

ϕ **4.6 Strength Margin**—When any part of the load moment system is employed in the supporting system so that its failure could cause the load to be dropped, its strength margin shall not be less than the minimum strength margin of the other supporting members such as block, hoisting ropes, and rope fittings.

4.7 Operational Check—The system shall have a means for the operator or other responsible persons to determine that it is operative prior to use.

4.8 Testing—The system shall be performance tested by the installer initially and by the user at recommended intervals, or at any time there is an indication of inaccuracy. (See paragraph 4.3, paragraph 4.4, and Section 6.)

ϕ **5. General Requirements**

5.1 Installation and Maintenance—Installation and maintenance of the load moment device and maintenance of the crane should be in accordance with the manufacturer's recommendations to assure system accuracy.

5.2 Labeling—Labels shall be conspicuously placed on a system component(s) or in the operator's cab or both, giving the following information:

5.2.1 Identification of applicable load rating chart and rating conditions.

5.2.2 Units of measure as applicable.

5.2.3 Maximum capacity of the load moment system per paragraph 4.2.

5.2.4 Operating range of the load moment system for which the accuracy requirements of paragraphs 4.3 and 4.4 are met.

5.2.5 Basic operating instructions and precautions.

5.2.6 Device manufacturer's name, address, model, and serial numbers.

5.2.7 Statement of compliance to SAE Recommended Practice J159 (include appropriate revision).

5.3 Manual—An operation, installation, and service manual(s) shall be provided by the manufacturer and be available to the operator or other responsible persons at all times.

6. Performance Evaluation Tests

6.1 General testing requirements:

6.1.1 Specific test instructions shall be provided by the manufacturer.

6.1.2 Test personnel shall be thoroughly familiar with the manufacturer's manuals for the system and shall check system for all functions.

6.1.3 All required equipment shall be on hand, prior to start of test.

6.1.4 System test shall be conducted using an appropriately configured crane and specified load rating chart.

6.1.5 For initial system calibration, tests should be conducted at or near the minimum and maximum of the boom lengths and of the radii/angle with two or more test loads.

6.1.6 For periodic calibration checks, employ one or more test loads of known weight and increase radius until alarms are activated.

6.1.7 Test Data—Test forms shall include, but not be limited to, the following information:

a) Owner(s).

b) Crane manufacturer, model, and serial number.

c) Device manufacturer, model, and serial number.

d) Crane configuration at time of test, method of test load application, location of load sensor, radius/angle sensor, and test readings.

e) A statement that the system met (did not meet) the accuracy requirements of 4.3 and 4.4 or that recalibration was necessary in order to achieve the required accuracy. The system accuracy calculation shall be a part of this report.

6.1.8 All test records shall be signed and dated. A copy of the current test record shall be available at all times.

6.2 Load Test Procedures—Test procedures shall include one of the methods described below or equivalent.

6.2.1 Known Weight:

a) Test load to be applied by suspending known weights (accurate to ±1%). If the weights of all additional equipment such as blocks, slings, sensors, etc., are included in the test load, the total load shall be known to an accuracy of ±1%. Starting with load at a short