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MICROCELL ASSEMBLY MODELS M20, M30 AND M30R

FOR

HAZARDOUS LOCATION APPLICATIONS

FROM

KISTLER-MORSE CORPORATION

10201 WILLOWS ROAD NE

REDMOND, WASHINGTON 98052

J.I. 3V1A1.AX  
(3610,3611)

OCTOBER 7, 1992



**Factory Mutual Research**

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P.O. Box 9102  
Norwood, Massachusetts 02062



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## I INTRODUCTION

1.1 Kistler-Morse Corporation requested examination of the apparatus listed in Section 1.2 to be in compliance with the applicable requirements of the following standards:

| <u>Title</u>   | <u>No.</u>     | <u>Issue Date</u> |
|--|----------------|-------------------|
| Electrical Equipment for Use In Hazardous (Classified) Locations General Requirements  | Class No. 3600 | March 1989        |
| Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1 Hazardous (Classified) Locations | Class No. 3610 | October 1988      |

Note: Factors applied to voltage or current rather than energy.

|  |                |            |
|--|----------------|------------|
| Electrical Equipment for Use in Class I, Division 2, Class II, Division 2 Class III, Divisions 1 and 2 Hazardous Locations | Class No. 3611 | April 1986 |
|--|----------------|------------|

1.2 The following was evaluated as intrinsically safe apparatus for Class I, Division 1, applicable Groups C and D hazardous indoor locations when installed per Kistler-Morse Drawing Number TI-MC.FM-01, Rev. E; nonincendive Class I, Division 2, Groups A, B, C and D and will appear in the Approval Guide as follows:

IS/I/1/CD - TI-MC.FM-01/E.  
NI/I/2/ABCD

Microcell Assembly. Models M20, M30, M30R.

1.3 The intrinsically safe interface, Model ISI-100 used with the subject microcell sensor assemblies per control Drawing No. TI-MC.FM-01, Rev. E was previously Approved by FMRC under J.I. 1N2A1.AX.

## II DESCRIPTION

2.1 The microcell sensor is semiconductor strain gauge. When the microcell is compressed or stretched, a resistance imbalance is created between the two silicon crystals connected as the active elements in a half-bridge circuit, a linear high-level signal results. The microcell assemblies measure changes in compression of the support member in storage vessels and provides an electrical output directly related to material weight when affixed to a vessel's support structure. The strain on the member causes the microcell resistances to change proportionally to the applied weight. These resistance changes cause an electrical signal to be transmitted via an intrinsically safe interface to the electronics such as an A/D converter in a microprocessor-based signal processor or to an analog amplifier in a non-digital system. This output is conditioned by an amplifier which is calibrated to provide weight or level indications. The bolt-on microcell assembly is directly attached to a vessel's vertical and/or horizontal support member or attached with an adapter welded on to the member. One or more load cells may be mounted on each support member to average the loading and reduce thermal effects. Load cell assemblies for each support are terminated in a conduit box and all conduit boxes for each vessel are connected in parallel by a single, shielded, three conductor cable. The cable is then routed through protective barrier assemblies then to the system electronics.

2.2 Intrinsically Safe Interface-The interface of the system(s) examined, limit the energy to the hazardous locations. The specific interface is listed within the document referenced in Section 1.2. Previous examination (J.I. 1N2A1.AX) covers their Approval.

## III EXAMINATION AND TESTS

3.1 General-Representative samples of the subject apparatus was tested and examined by Factory Mutual Research Corporation (FMRC) to determine its acceptability for use in the specified hazardous location. The re-examination included circuit analysis, review of the manufacturer's documentation and the unit's physical construction. All were satisfactory and are summarized in the following sections.