



Not to be distributed outside of FM Approvals and its affiliates except by Customer

APPROVAL REPORT

BT, HT, LT AND MT SERIES FIRESAFE VALVE ACTUATORS

Prepared for:

**Bi-Torq Valve Automation
1N050 Linlar Drive
La Fox, IL 60147
U.S.A.**

Project ID: 3035118

Class: 7440

Date of Approval: 22 December 2009

Authorized by: J. E. Marquedant
J.E. Marquedant, Group Manager, Electrical

**BT, HT, LT AND MT SERIES
FIRESAFE VALVE ACTUATORS**

from

**Bi-Torq Valve Automation
1N050 Linlar Drive
La Fox, IL 60147
U.S.A.**

I INTRODUCTION

- 1.1 Bi-Torq Valve Automation. has requested examination for Approval of their BT, HT, LT and MT Series Firesafe Valve Actuators.
- 1.2 This Report may be freely reproduced only in its entirety and without modification.
- 1.3 **Standards:**

| Title | Class No. | Issue Date |
|--------------------------------------|-----------|------------|
| Liquid and Gas Safety Shutoff Valves | 7400 | April 1998 |
| Fire Safe Valves | 7440 | May 1981 |

- 1.4 **Listing:** The product will appear in the FM Approval Guide, an online resource of FM Approvals, as follows:

FLAMMABLE LIQUID EQUIPMENT

**Firesafe Shutoff Valves
Thermal Link Actuators**

Thermal Link Spring Loaded to Close Actuators...

Models: FL-LT-039-***-a-BV and FL-LT-059-***-a-BV (a = 005, 007, 010, 012, 015 or 020). Torque ranges from 0 to 155 in-lbs (0-34 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-MT-079-***- a-BV and FL-MT-089-***- a-BV, FL-MT-079-***- a-BFV-DT7 and FL-MT-089-***-a-BFV-DT7 (a = 012, 015, 020, 025, 030, 040, 050, 060 or 080). Torque ranges from 156-830 in-lbs (35-182 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-HT-109-***- a-BV-DT7 and FL-HT-129-***-a-BV-DT7 (a = 025, 030, 040, 060 or 080). Torque ranges from 831-1810 in-lbs (183-398 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-BT-149X-***- a-BV-DT12, FL-BT-149-***- a-BV-DT12, FL-BT-169X-***-a-BV-DT12, FL-BT-169-***-a-BV-DT36 and FL-BT-189-***-a-BV-DT50 (a = 025, 030, 040, 060 or 080). Torque ranges from 1811-21390 in-lbs (399-4825 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

FM APPROVALS
Project ID: 3035118

**Firesafe Valve Actuators
Thermal Link Actuators**

Thermal Link Spring Loaded to Close Actuators...

Models: FL-LT-039-***-a-BV and FL-LT-059-***-a-BV (a = 005, 007, 010, 012, 015 or 020). Torque ranges from 0 to 155 in-lbs (0-34 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-MT-079-***-a-BV and FL-MT-089-***-a-BV, FL-MT-079-***-a-BFV-DT7 and FL-MT-089-***-a-BFV-DT7 (a = 012, 015, 020, 025, 030, 040, 050, 060 or 080). Torque ranges from 156-830 in-lbs (35-182 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-HT-109-***-a-BV-DT7 and FL-HT-129-***-a-BV-DT7 (a = 025, 030, 040, 060 or 080). Torque ranges from 831-1810 in-lbs (183-398 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-BT-149X-***-a-BV-DT12, FL-BT-149-***-a-BV-DT12, FL-BT-169X-***-a-BV-DT12, FL-BT-169-***-a-BV-DT36 and FL-BT-189-***-a-BV-DT50 (a = 025, 030, 040, 060 or 080). Torque ranges from 1811-21390 in-lbs (399-4825 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

**Firesafe Valve Actuators
Firesafe Actuators**

Thermal Link Spring Loaded to Close Actuators...

Models: FL-LT-039-***-a-BV and FL-LT-059-***-a-BV (a = 005, 007, 010, 012, 015 or 020). Torque ranges from 0 to 155 in-lbs (0-34 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-MT-079-***-a-BV and FL-MT-089-***-a-BV, FL-MT-079-***-a-BFV-DT7 and FL-MT-089-***-a-BFV-DT7 (a = 012, 015, 020, 025, 030, 040, 050, 060 or 080). Torque ranges from 156-830 in-lbs (35-182 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-HT-109-***-a-BV-DT7 and FL-HT-129-***-a-BV-DT7 (a = 025, 030, 040, 060 or 080). Torque ranges from 831-1810 in-lbs (183-398 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

Models: FL-BT-149X-***-a-BV-DT12, FL-BT-149-***-a-BV-DT12, FL-BT-169X-***-a-BV-DT12, FL-BT-169-***-a-BV-DT36 and FL-BT-189-***-a-BV-DT50 (a = 025, 030, 040, 060 or 080). Torque ranges from 1811-21390 in-lbs (399-4825 Nm). Link temperatures available: 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C).

FM APPROVALS
Project ID: 3035118

- 1.5 Examination and tests were in accordance with the applicable requirements of FM Approval Standards listed in 1.3.

II DESCRIPTION

- 2.1 The BI-TORQ BT, HT, LT and MT Series Actuators use an armed spring pack held in position by a fusible link. When the link melts and separates the actuator provides a quarter turn rotation to open or close the valve it is mounted on.
- 2.2 **LT Series Actuators:** The LT Series Actuators are for use on valves requiring up to 155 inch pounds of torque. The fusible link is FM Approved Tyco Model FL-1, available in 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C) operating temperatures. The LT Series has a handle to allow manual operation of the valve while armed.
- 2.3 **MT Series Actuators:** The MT Series Actuators are for use on valves requiring up to 830 inch pounds of torque. The fusible link is FM Approved Tyco Model FL-1 available in 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C) operating temperatures. The MT Series has a handle to allow manual operation of the valve.
- 2.4 **HT Series Actuators:** The HT Series Actuators are for use on valves requiring up to 1,810 inch pounds of torque. The fusible link is FM Approved Tyco Model FL-1 or Globe Model K available in 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C) operating temperatures. The HT Series has a declutch mechanism to allow manual operation of the valve after disarming the fusible links.
- 2.5 **BT Series Actuators:** The BT Series Actuators are for use on valves requiring up to 21,390 inch pounds of torque. The BT actuators use up to six fusible links in parallel. The fusible links are or Globe Model K available in 135°F (57°C), 165°F (74°C), 212°F (100°C), 280°F (138°C), 360°F (182°C) operating temperatures. The BT Series has a declutch mechanism to allow manual operation of the valve after disarming the fusible links.

III EXAMINATIONS AND TESTS

- 3.1 Samples of the BT, HT, LT and MT actuators were examined and tested at the FM Approvals facility in Norwood, MA. Examination showed that the valve is constructed in accordance with the manufacturer's specifications. All data is on file along with other documents and correspondence applicable to this program
- 3.2 **Ambient Temperature Effects Test:** Samples of the BT, HT, LT and MT actuators were conditioned for more than four hours at -4°F (-20°C) and at 212°F (100°C). There was no false actuation or adverse affect on the actuators. The actuators operated properly in the manual mode at these temperatures and upon return to room temperature. The actuators will be tested for loss of actuating medium (fusible link operation) as the final test. This is satisfactory.
- 3.3 **Impact Test:** Samples each of the BT, HT, LT and MT actuators were subjected to impact tests. Tests were conducted on the samples while the samples were at -4°F (-20°C). Each sample was subjected to impact from a 50.8 mm steel sphere at a 7 Joule magnitude. The impacts were obtained by dropping a 1.18 lb (0.5351.8 kg) weight from a height of 52 inches (133 cm) onto the various areas. Results were satisfactory in that no damage occurred to the test samples.

FM APPROVALS
Project ID: 3035118

- 3.4 **Vibration:** Samples of the BT, HT and LT actuators subjected to a vibration test. The equipment was mounted in its normal positions and subjected to a vertical vibration with total displacement of 0.02 in. (0.5 mm) at a frequency sweep of 10-30 Hz for a period of four hours. There were no loose parts, no false actuation or adverse affect on the actuators. The actuators operated properly in the manual mode following this exposure. The actuators will be tested for loss of actuating medium (fusible link operation) as the final test. This is satisfactory.
- 3.5 **Operating Characteristics:** Samples of the BT, HT, LT and MT actuators were tested for proper operation at -20°C. The actuating medium is a fusible link that holds the actuator open against a return spring. Upon operation (melting) of the fusible link the return spring will close the actuator. In each case the actuators operated (¼ turn) in less than one second when the fusible link operated, compared to the maximum allowable 5 seconds. This is satisfactory.
- 3.6 **Torque:** The closing torque of each actuator was measured and compared to the manufacturer's specified torque values. The results are shown below, in each case the measured value was within 10% of the specified values. This is satisfactory.

| Actuator | Rated Torque (INCH POUNDS) | Measured Torque (INCH POUNDS) |
|----------|-------------------------------|----------------------------------|
| LT | 150 | 156 |
| MT | 375 | 420 |
| HT | 1270 | 1452 |
| BT | 4230 | 4812 |

IV MARKING

The manufacturer's permanently attached nameplate is shown on Drawings FMLABEL1-0507 and FMLABEL2-08149. Copies of these drawings are included as attachments to this report.

V FACILITIES AND PROCEDURES AUDIT

The manufacturing sites in La Fox, Illinois were audited as part of this examination. The facilities and quality control procedures have been found satisfactory to manufacture product identical to that examined and tested as described herein. These facilities will be subject to follow-up inspections and the addition of the products now examined to this manufacturer's currently approved line represented no change to manufacturing or quality control procedures that would require a special audit.

FM APPROVALS
Project ID: 3035118

VI DOCUMENTATION

The following drawings/documents describe the BT, HT, LT and MT Series Firesafe Valve Actuators and are filed under Project 3035118.

| <u>Drawing No.</u> | <u>Revision Level</u> | <u>Drawing Title</u> |
|-------------------------|-----------------------|---|
| FL-BT-INST | 0409 | BT IOM |
| FL-HT-10-DWG-102609 | 1.B | PARTS...FL-HT-109-***-XXX-BV-DT7 |
| FL-HT-12-DWG-102609 | 1.B | PARTS...FL-HT-129-***-XXX-BV-DT7 |
| FL-HT-14X-DWG-102609 | 1.B | PARTS...FL-HT-149X-***-XXX-BV-DT12 |
| FL-HT-INST | 0309 | HT IOM |
| FL-LT-05-DWG-102609 | 1.B | ASSEMBLY...FL-LT-059-***-XXX-BV |
| FL-LT-INST | 1106 | LT IOM |
| FL-MT-07-BFV-DWG-102609 | 1.B | ASSEMBLY...FL-MT-079-***-XXX-DT7-BFV |
| FL-MT-07-BV-DWG-102609 | 1.B | ASSEMBLY...FL-MT-079-***-XXX-BV |
| FL-MT-08-BFV-DWG-102609 | 1.B | ASSEMBLY...FL-MT-089-***-XXX-DT7-BFV |
| FL-MT-08-BV-DWG-102609 | 1.B | ASSEMBLY...FL-MT-089-***-XXX-BV |
| FL-MT-09-BFV-DWG-102609 | 1.B | ASSEMBLY...FL-MT-099-***-XXX-DT7-BFV |
| FL-MT-09-BV-DWG-102609 | 1.B | ASSEMBLY...FL-MT-099-***-XXX-DT7-BV |
| FL-MT-INST | 0409 | MT IOM |
| FMLABEL1-0507 | 1.A | DRAWING FOR FM LABEL LT-,MT SERIES |
| FMLABEL2-08149 | 1.A | DRAWING FOR FM LABEL MT-, HT, & BT SERIES |

VII MANUFACTURERS RESPONSIBILITIES

As part of the listing requirements, FM Approvals requires assurance that subsequent units produced will present the same quality and reliability as previously examined. The manufacturer shall maintain a Quality Assurance Program which includes as a minimum: incoming, in-process, and final inspection and testing; equipment calibration; and drawing change control. The specific procedures used to control quality are best determined by the manufacturer. No change to this information is permitted without prior written consent of FM Approvals. Requests for changes must be submitted to FM Approvals on Form 797, Approved Product-Revision Report. Unauthorized changes may result in withdrawal of approval

VIII CONCLUSION

The valves described in 1.4 meet FM Approvals requirements. Since a duly signed Master Agreement is on file for this manufacturer, Approval is effective the date of this report.

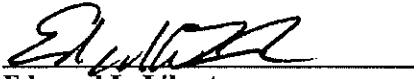
TESTING BY: E. W. LaLiberte, G. D. Desrochces, J. Almedia, R. Levine

PROJECT DATA RECORD: PDR 3035118

ATTACHMENTS: Nameplate Drawing Nos. FMLABEL1-0507 and FMLABEL2-08149

FM APPROVALS
Project ID: 3035118

REPORT BY:



Edmond LaLiberte
Senior Engineer
Electrical Systems

REPORT REVIEWED BY:



Patrick J. Byrne
Technical Team Manager
Electrical Systems

BI-TORG®
ACTUATORS & VALVE AUTOMATION PACKAGES

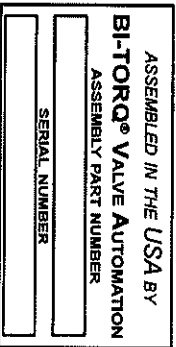


CARBO-BOND, INC.
AUTOMATED VALVE MOUNTING KITS



NAMEPLATE FOR 05 THROUGH 07 ASSEMBLIES

ID Label for 059-079 sizes



SILVER BACKGROUND
BLACK LETTERING
1" TALL BY 2" WIDE
BLACK 1 pt BORDER

Stand-alone FM mark for 059-079 sizes



SILVER BACKGROUND
BLACK LETTERING
1" TALL BY 2" WIDE
BLACK 1 pt BORDER

note: both labels to be affixed to spring pack and/or mounting bracket after passing testing



Drawing for FM label for LT- and MT Series fusible link
using 059 and 079 spring packs

10-27-09

Revision: 1 A

DAM

FMLABEL1-0507

BI-TORQ[®]
ACTUATORS & VALVE AUTOMATION PACKAGES



CARBO-BOND, INC.
AUTOMATED VALVE MOUNTING KITS



NAMEPLATE FOR 08 THROUGH 149X ASSEMBLIES

ID Label for 089-149X sizes (MT-BT)

| | |
|---|----------------------|
| ASSEMBLED IN THE USA BY | |
| BI-TORQ[®] VALVE AUTOMATION | |
| 11060 LINDAN DRIVE • LA FOY, IL | |
| TEL: 630-208-9343 WWW.BITORQ.COM | |
| MODEL NUMBER | <input type="text"/> |
| SERIAL NUMBER | <input type="text"/> |

APPROVED

SILVER BACKGROUND
BLACK LETTERING
1.5" TALL BY 3" WIDE
BLACK 1 pt BORDER

note: labels to be affixed to spring pack and/or mounting bracket after passing testing



| | |
|---|----------------|
| Drawing for FM label for MT-, HT, & BT Series fusible link using 089 thru 149X spring packs | |
| 10-27-09 | Revision: 1.A |
| DAM | FMLABEL2-08149 |