Safety Bulletin		
No: SB031	Rev 0	Date: October 9, 2007
Description: OEM 400 HP Motor Lead Wiring		

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AFFECTED PRODUCT:

The affected products include all EMI 400 top drives (both 150T and 250T) with unit numbers 500 and below that were manufactured before June 1, 2007.

BACKGROUND INFORMATION:

TESCO received a number of Oilfield Electric Marine (OEM TT400) motors that contained deficiencies that may result in electrical safety hazards. The deficiencies that require corrective action to be taken are as follows:

1) Insufficient clearance between 600VAC motor connections and junction box enclosure
2) Improper motor lug connections
3) Insufficient sealing of motor leads at motor junction box point of entry

Insufficient clearance between 600VAC motor connections and junction box enclosure:
On 600VAC systems, the Canadian Electrical Code requires a 1" clearance between busbars, including electrical terminations, and any grounded surface. Figure 1 verifies that a minimum of 1" clearance is not maintained between the busbar motor termination bolts and the motor junction box cover.

(a)

Figure 1 – Insufficient clearance between 600VAC motor connections and junction box enclosure

Figure 2 illustrates how a minimum of 1” clearance between the motor terminations and junction box cover can be maintained by relocating the motor terminations to the center of the busbars.

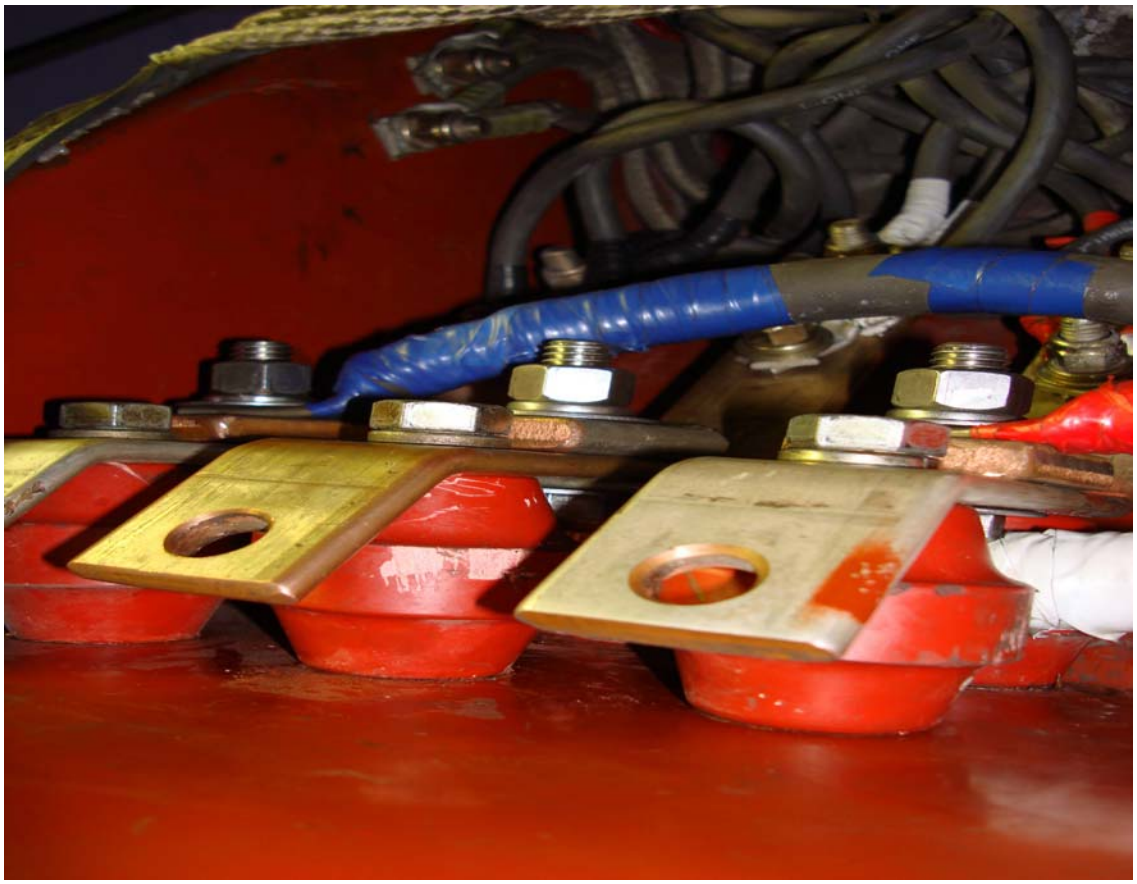

Figure 2 – Sufficient clearance maintained between 600VAC motor connections and junction box enclosure

Improper motor lug connections:
A number of OEM motors have been identified as having an incorrect crimp lug on the motor power lead wires, as well as an improperly terminated lug connection. This can be identified by exposing the motor cable termination lugs to ensure they are tightly secured to the motor leads with the correct size motor lug, and are secured to the motor lead utilizing one of the following methods:

a. Crimp and solder
b. Crimp only, utilizing a hexagonal style crimping die

Figure 3 shows an improperly terminated motor cable lug. It shows that the termination lug is not secured by either of the approved methods; as well, an improperly sized lug was used. This may cause a condition where the motor lead connection is susceptible to failure and could lead to a shock or shorting hazard.

Figure 3 – Incorrect motor termination. 4/0 gauge (purple) crimp lug on 2/0 gauge wire, not crimped and soldered or crimped utilizing a hexagonal style crimping die

Insufficient sealing of motor leads at motor junction box point of entry:
As shown in Figure 5 below, an air gap was found around the motor leads where the leads enter the junction box. This gap must be properly sealed because water, dust, or other debris could enter the junction box and create an electrical hazard.

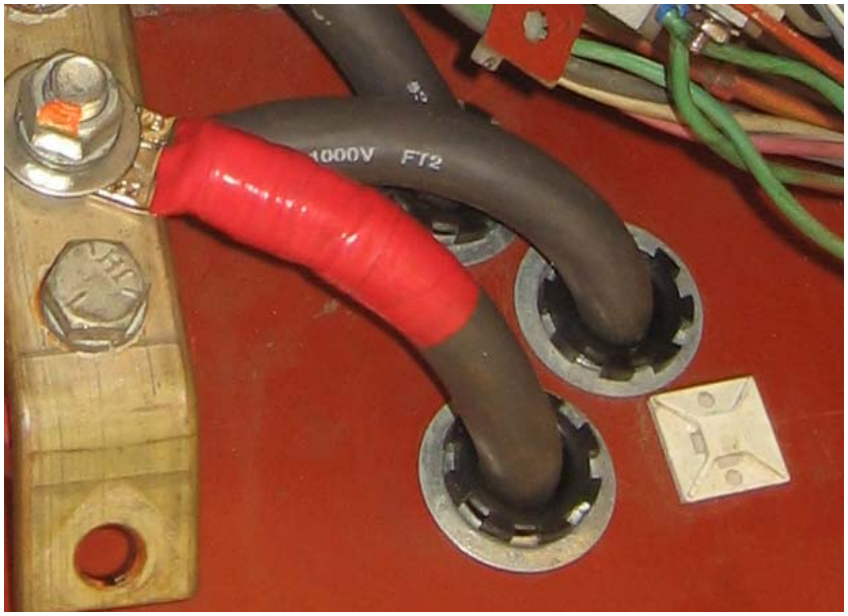

Figure 5 – Air gap around motor leads entering junction box

Figure 6 illustrates the corrective action, which is the installation of cable sealing glands around the motor leads at the entry point, thus eliminating the air gap.

Figure 6 – Sealing gland eliminates air gap around motor leads entering junction box

ACTION REQUIRED:
At the earliest possible instance an inspection should be made of the OEM (TT400) motors to determine if a unit requires repair. The procedure below describes how to repair the deficiencies illustrated in this bulletin.

1. Ensure the top drive is de-energized and all applicable safety precautions are followed.
2. Remove safety wire and bolts from motor junction box panel.
3. Install sealing gland around cables at junction box entry point, if not already present.
4. Remove vinyl tape from lug crimp area to expose crimp.
5. Inspect lug to determine if the correct lug has been used and if it has been secured by one of the following methods:
    a. Crimp and soldered
        Reference OEM Service Bulletins
        - Service Bulletin #201 Rev2 (Tesco 400HP AC Motors with 2/0 cable), Figure 7
        - Service Bulletin #202 Rev2 (Tesco 400HP AC Motors with 3/0 cable), Figure 8
        - Service Bulletin #203 Rev1 (Tesco 400HP AC Motors with 4/0 cable), Figure 9

    b. Crimp only, utilizing a hexagonal style crimping die

    If required install the correctly sized crimping lug utilizing a cUL/UL approved hexagonal style crimping die (i.e.; Greenlee “U” style dies).

    Note:
    - For OEM motors with 2/0 cable, replace with a 3/0 gauge lug with ½” mounting hole. TESCO PN 14637 is the correct crimp lug to use for this connection. This lug must be crimped using a #50 crimp die. Take care to ensure the lead order is maintained.
    - For OEM motors with 3/0 cable, replace with a 4/0 gauge lug with ½” mounting hole. This lug must be crimped using a #54H crimp die. Take care to ensure the lead order is maintained.
    - For OEM motors with 4/0 cable, replace with a 250 gauge lug with ½” mounting hole. TESCO PN 4570 is the correct crimp lug to use for this connection. This lug must be crimped using a #62 crimp die. Take care to ensure the lead order is maintained.

6. Ensure 1” clearance between busbars, including electrical terminations, and motor junction box enclosure is maintained.
    a. If required, correct by moving motor terminations from top of busbars to middle of busbars between insulators. Ensure that motor lead order is maintained.
7. Torque the motor lead bolts to 75 ft-lb upon reassembly.
8. Apply new protective electrical tape.
9. Replace junction box lid and safety wire bolts.

Figure 7 – OEM Service Bulletin # 201

LeTourneau TECHNOLOGIES POWER SYSTEMS	MOTOR DIVISION SERVICE BULLETIN	MSE-FRM-003
		Rev. 00
	REVIEWED BY: 8-16-07 APPROVED BY: 8/16/07	Released 06/04/2007
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SERVICE BULLETIN # 201 Rev2

Issued By: Joe Hope

Issue Date: August 14, 2007

1.0 Product: Tesco 400HP AC Motors with 2/0 cable

2.0 Issue: 1. Motors were built with 200° C 2/0 cable and 90° C 4/0 lugs. This has caused lead wires to burn open.
2. There is an air gap around motor leads entering J-box. This causes water and mud to enter j-box.
3. Conductor termination hardware interfering with J-box cover. This causes a safety hazard due to insufficient electrical clearance.

3.0 Fix:
1. Install 200° C Nickel plated high temperature ½" hole long barrel lugs.
2. Install insulated bushings around cables and move conductors to holes in between insulators.
3. Move conductors to holes in between insulators.

4.0 Actions:

-Remove existing lugs from all field motors with aforementioned 2/0 cable.

-Replace grommet for cable entering junction box with a heat-shrinkable insulated bushing. It is acceptable for this bushing to be installed with the heat shrink on the plenum (non-junction box) side.

-Crimp and solder high temperature 3/0 nickel plated lugs to the lead wire. 3/0 lugs are acceptable due to the increased size of the flexible 2/0 cable.

-Using a pre-cut spacer made from bus bar mount the lead wires to the new location between the insulators.

a. Leads must be taped red, white, and blue as viewed from left to right. The only exception to this is the case where a customer has a Top Drive already running. In this case, do not change the order of the lead wire.

b. It is acceptable for A phase (left bus) to be mounted without the bus spacer.

c. Bending of the lug should be kept to a minimum. Maximum allowable bend is ninety degrees, however a case should never arise where bending angle is required to exceed 45 degrees.

d. Cable may not be run under the bus bar.

e. All electrical clearances must be at least one inch.

f. Crimping die must match the gauge of the lug.

g. Any lead wire not long enough to terminate properly should be cut and spliced near the stator. If more than one lead is required to be spliced, the splices must be staggered such that no two splices are adjacent. New cable should be of the same gauge as the cable it is being spliced to (2/0 in this case). Splice is to be made using a crimped and soldered butt-splice. The crimping dye must match the gauge of the lug being crimped. The crimp must be completely insulated using 5kV heat shrink material.

-2/0 cable will no longer be used on 400HP motors. Only 4/0 cable and appropriate lugs will be used on future motors.

5.0 Contact:

For additional information:

Joe Hope
Engineering Manager- Motor Division
6401 W. Sam Houston Pkwy. North
Houston, Texas 77041
Tel: 713-983-4811

Figure 8 – OEM Service Bulletin # 202

LeTourneau TECHNOLOGIES POWER SYSTEMS	MOTOR DIVISION SERVICE BULLETIN	MSE-FRM-003
		Rev. 00
	REVIEWED BY: 8-16-07 M. Murphy APPROVED BY: 8/16/07	Released 06/04/2007
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SERVICE BULLETIN # 202 Rev2

Issued By: Joe Hope

Issue Date: August 14, 2007

1.0 Product: Tesco 400HP AC Motors with 3/0 cable

2.0 Issue: 1. There is an air gap around motor leads entering J-box. This causes water and mud to enter j-box.
2. Conductor termination hardware interfering with J-box cover. This causes a safety hazard due to insufficient electrical clearance.

3.0 Fix:
1. Verify 3/0 or 4/0 lugs are being used. May not require action.
2. Install insulated bushings around cables and move conductors to holes in between insulators.
3. Move conductors to holes in between insulators.

4.0 Actions:

-Remove existing lugs from all field motors with aforementioned 3/0 cable.
-Replace grommet for cable entering junction box with a heat-shrinkable insulated bushing. It is acceptable for this bushing to be installed with the heat shrink on the plenum (non-junction box) side.
-Crimp and solder 3/0 or 4/0 lugs to the lead wire. 4/0 lugs are acceptable due to the increased size of the flexible 3/0 cable.
-Using a pre-cut spacer made from bus bar mount the lead wires to the new location between the insulators.
  a. Leads must be taped red, white, and blue as viewed from left to right. The only exception to this is the case where a customer has a Top Drive already running. In this case, do not change the order of the lead wire.
  b. It is acceptable for A phase (left bus) to be mounted without the bus spacer.
  c. Bending of the lug should be kept to a minimum. Maximum allowable bend is ninety degrees, however a case should never arise where bending angle is required to exceed 45 degrees.
  d. Cable may not be run under the bus bar.
  e. All electrical clearances must be at least one inch.
  f. Crimping die must match the gauge of the lug.
  g. Any lead wire not long enough to terminate properly should be cut and spliced near the stator. If more than one lead is required to be spliced, the splices must be staggered such that no two splices are adjacent. New cable should be of the same gauge as the cable it is being spliced to (3/0 in this case). Splice is to be made using a crimped and soldered butt-splice. The crimping dye must match the gauge of the lug being crimped. The crimp must be completely insulated using 5kV heat shrink material.
-3/0 cable will no longer be used on 400HP motors. Only 4/0 cable and appropriate lugs will be used on future motors.

5.0 Contact:

For additional information:
Joe Hope
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6401 W. Sam Houston Pkwy. North
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Figure 9 – OEM Service Bulletin # 203

LeTourneau TECHNOLOGIES POWER SYSTEMS	MOTOR DIVISION SERVICE BULLETIN		MSE-FRM-003
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SERVICE BULLETIN # 203 Rev1

Issued By: Joe Hope

Issue Date: August 14, 2007

1.0 Product: Tesco 400HP AC Motors with 4/0 cable

2.0 Issue: 1. Conductor termination hardware interfering with J-box cover. This causes a safety hazard due to insufficient electrical clearance.

3.0 Fix:
1. Verify 4/0 or 250MCM lugs are being used. May not require action.
2. Move conductors to holes in between insulators.

4.0 Actions:
-Verify lugs are either 4/0 or 250MCM, crimped properly and soldered.
-250 MCM lugs are acceptable due to the increased size of the flexible 4/0 cable.
-Using a pre-cut spacer made from bus bar mount the lead wires to the new location between the insulators.
a. Leads must be taped red, white, and blue as viewed from left to right. The only exception to this is the case where a customer has a Top Drive already running. In this case, do not change the order of the lead wire.
b. It is acceptable for A phase (left bus) to be mounted without the bus spacer.
c. Bending of the lug should be kept to a minimum. Maximum allowable bend is ninety degrees, however a case should never arise where bending angle is required to exceed 45 degrees.
d. Cable may not be run under the bus bar.
e. All electrical clearances must be at least one inch.
f. Crimping die must match the gauge of the lug.
g. Any lead wire not long enough to terminate properly should be cut and spliced near the stator. If more than one lead is required to be spliced, the splices must be staggered such that no two splices are adjacent. New cable should be of the same gauge as the cable it is being spliced to (4/0 in this case). Splice is to be made using a crimped and soldered butt-splice. The crimping dye must match the gauge of the lug being crimped. The crimp must be completely insulated using 5kV heat shrink material.

5.0 Contact: For additional information:

Joe Hope
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Tel: 713-983-4811

Contact your local TESCO Parts and Service Center for further information regarding this bulletin and or supply of affected components noted above.