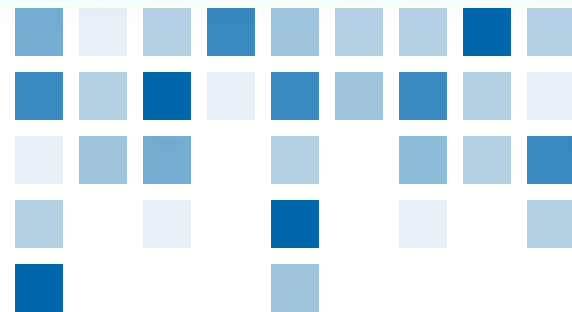
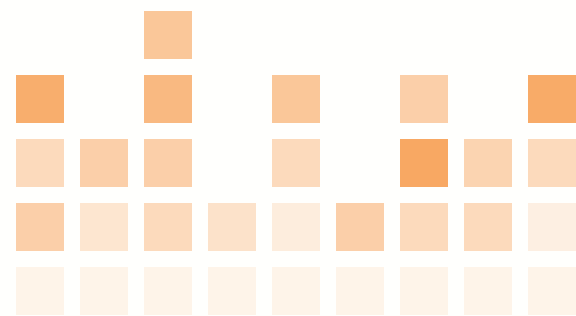


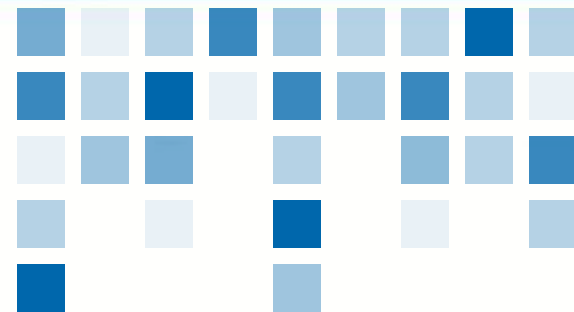


# SHACMAN 汽车电器知识培训

F2000-F3000

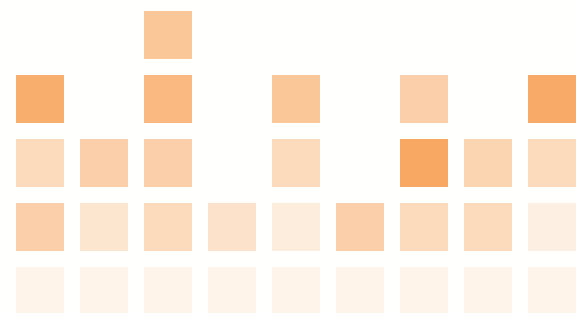
陕汽进出口公司服务部培训科





# SHACMAN Electrical Training

F2000-F3000



# 第一课 电气通用准则 Lesson 1 General Electrical Guidelines

## 一、基本准则

### 1、 Basic guidelines

1、线束、电器元件装配完毕后，均要进行自检，防止出现因装配不合格导致的故障和事故。

2、起动整车前需确认周围人员处于安全位置。

3、需在整车上进行焊接作业时，应断开整车电源总开关，以及其它精密控制单元的连接器（如电控发动机ECU，自动变速箱ECU等），焊接用搭铁线应尽量远离整车线束，并且搭铁要牢固、可靠。

4、应尽量避免对整车进行带电操作作业，若不能避免时应使用带绝缘保护的工具进行工作。

1 After the assembly of wiring harnesses and electrical components is completed, self inspection should be carried out to prevent faults and accidents caused by unqualified assembly.

2 Before starting the entire vehicle, it is necessary to confirm that the surrounding personnel are in a safe position.

3 When welding operations need to be carried out on the entire vehicle, the main power switch of the vehicle and the connectors of other precision control units (such as electronic control engine ECU, automatic transmission ECU, etc.) should be disconnected. The grounding wire for welding should be as far away from the vehicle harness as possible, and the grounding should be firm and reliable.

4 Live working on the entire vehicle should be avoided as much as possible. If unavoidable, tools with insulation protection should be used for work.



## 二、车辆启动时注意事项

### 2、Precautions when starting the vehicle

- 1、启动汽车前，要清理出足够汽车通行的通道，并清理周围的环境。
- 2、启动汽车前，要关掉收音机和摇下门窗，以便能听到车下人员的说话声。
- 3、启动汽车前，必须保证车辆下方和前方不能有人，必须要通知其他人员。
- 4、启动汽车前，确认变速器是在空档或驻车档。
- 5、启动汽车前，确认手制动阀处在制动位置。
- 6、启动汽车前，要将汽车排气接至车间的通风系统或打开门窗。

- 1 Before starting the car, it is necessary to clear enough passage for the car and clean the surrounding environment.
- 2 Before starting the car, turn off the radio and shake down the doors and windows so that you can hear the voices of people under the car.
- 3 Before starting the car, it is necessary to ensure that there are no people underneath or in front of the vehicle, and other personnel must be notified.
- 4 Before starting the car, make sure that the transmission is in neutral or park.
- 5 Before starting the car, make sure that the handbrake valve is in the braking position.
- 6 Before starting the car, connect the exhaust to the ventilation system in the workshop or open the doors and windows.



### 三、火灾和灭火器

|                                                                                             | 火灾类别和灭火方法                                          | 涉及的可燃物                  | 灭火器类型                                  |
|---------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------|----------------------------------------|
| <br>(绿色)   | 一般易燃品引起的,用降低易燃品温度、盖住燃烧着的易燃品等方法扑灭                   | 木材、纸张、布匹、橡胶、塑料、垃圾、装潢材料等 | 水、泡沫、多用途的化学制品                          |
| <br>(红色)   | 易燃液体引起的,用闷熄的办法扑灭。使用一种产生覆盖层、有隔绝火焰效果的灭火器;覆盖全部在燃的液体表面 | 汽油、润滑油(脂)、油漆、打火机液体      | 泡沫、二氧化碳、卤化剂、标准的干化学制品、紫色钾干化学制品、多用途干化学制品 |
| <br>(蓝色)   | 电气设备引起的,扑灭C级火灾要尽快地切断电源并使用防止触电的、非电导型的灭火剂            | 电机、电器、导线、熔断器盒、开关板       | 二氧化碳、卤化剂、标准的干化学制品、紫色钾化学制品、多用途干化学制品     |
| <br>(黄色) | 可燃的金属引起的,扑灭由金属屑引起的火灾,要采取闷熄或使用专门的灭火剂                | 铝、镁、钾、钠、钛、锌             | 干粉灭火器、干粉灭火剂                            |
| 表(1-1) 灭火器选择指南                                                                              |                                                    |                         |                                        |

火灾是按可燃物的种类分级的如表(1-1)中所示。操作者要能找出正确的灭火器控制火势,必须在紧急关头投入灭火。注意:在灭火中要注意安全,若发觉火势明显失控则赶快离开,并及时拨打火警电话。



#### 四、线束的敷设

1、电线束应敷设整齐、走向顺畅、各线束之间不能相互交叉、缠绕、扭转。线束应尽量不与尖锐金属、棱边、运动、发热部件接触；线束每隔200mm左右捆扎一根塑料紧固带，每隔500mm左右要有固定点，特殊位置需增加固定点，如图（1-5）所示；不允许出现线束杂乱、悬垂、干涉摩擦等现象。



图（1-5）效果图



#### 4、 Wiring harness laying

1. The wiring harness should be laid neatly, with a smooth direction, and each harness should not cross, wrap, or twist with each other. The wiring harness should avoid contact with sharp metals, edges, moving or heating components as much as possible; Bundle a plastic fastening strip every 200mm, and have fixing points every 500mm. Special positions require additional fixing points, as shown in Figure (1-5); It is not allowed to have disorderly wiring harnesses, overhangs, interference friction, and other phenomena.



图 (1-5) 效果图



## 四、线束的敷设

2、线束从穿线孔穿出时，需要在过线孔处加装穿线护套。例如：左右顶蓬线束、起动机线、主副油箱线、空滤器线、左右尾灯线、驾驶室锁止线、油中有水传感器线、燃油加热线、电动翻转线、前轴ABS 传感器线、ABS 电磁阀线、左右侧标志灯线等等。

如图（1-6）所示：



图（1-6）穿线护套效果图



## 4、 Wiring harness laying

2. When the wire harness passes through the threading hole, a threading sheath needs to be installed. For example: left and right roof wire, starter wire, main and auxiliary fuel tank wire, air filter wire, left and right tail light wire, cab locking wire, water in oil sensor wire, fuel heating wire, electric flip wire, front axle ABS sensor wire, ABS solenoid valve wire, left and right side marker light wire, etc. As shown in Figures (1-6):



图（1-6）穿线护套效果图

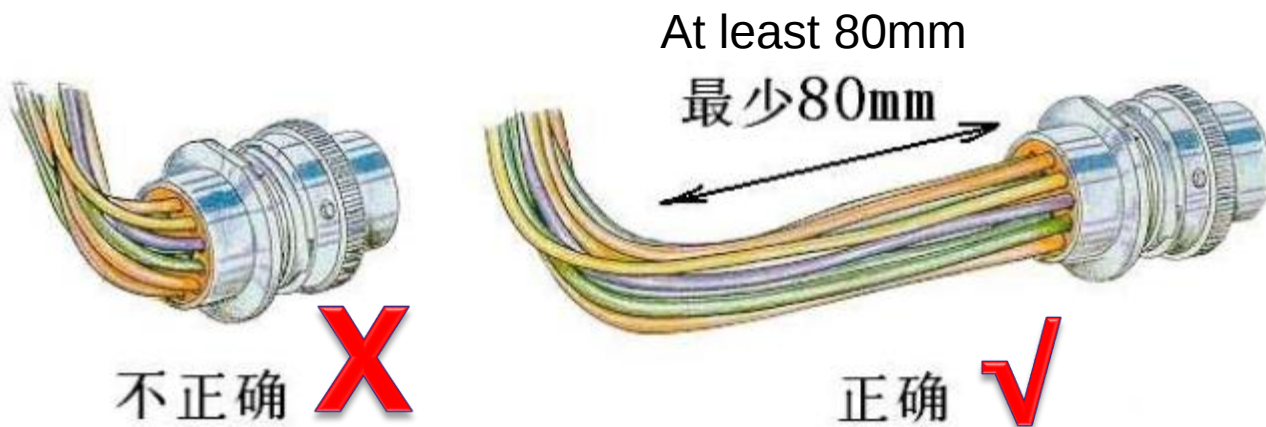


#### 四、线束的敷设

#### 4、Wiring harness laying

3、线束上带插接器时，线束在插接器处不得转弯太急，如图（1-7）所示。

3. When the harness is equipped with a connector, the harness should not turn too quickly at the connector, as shown in Figure (1-7).

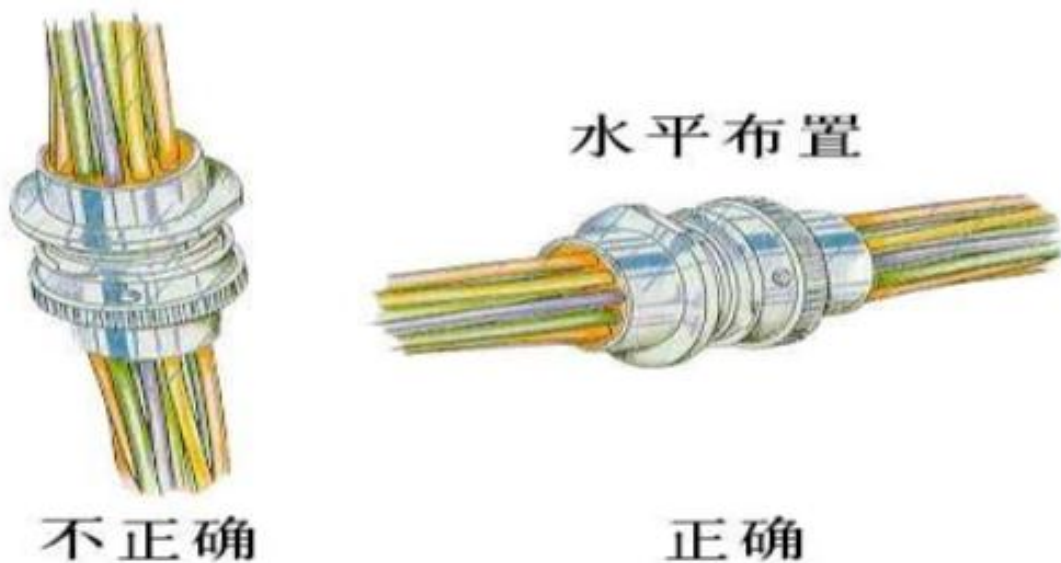


图（1-7）效果图



## 五、线束的连接

1、两个插接件连接时，要插接到位、牢固，两插接件之间的接触面积达到100%，插接件连接完毕后，将自带的橡胶或塑料绝缘护套套好，线束内及插接件上的金属介质不能外露。两个多孔插接器连接时，插接器之间的自锁机构要徒手装配到不能动为止，保证自锁机构装配到位，插接完毕后，要检查插接器中插接件不能退出插接器。对于底盘部分插接器连接完毕后，应尽可能水平布置，如图（1-9）所示。



图（1-9）示意图



## 5、 Connection of wiring harness

1. When connecting two connectors, they should be inserted in place and firmly. After the connector is connected, the rubber or plastic insulation sleeve should be covered, and the metal medium inside the harness and on the connector should not be exposed. When connecting two porous connectors, the self-locking mechanism between the connectors should be assembled until it cannot move, ensuring that the self-locking mechanism is assembled in place. After insertion, check that the terminals in the connector cannot be removed from the connector. After the chassis connectors are connected, they should be arranged horizontally as much as possible, as shown in Figure (1-9).



不正确



Horizontal layout

水平布置



正确



图 (1-9) 示意图



## 五、线束的连接

### 5、 Connection of wiring harness

2、底盘部分，外露的插接器，连接完毕后护套进线端要尽量向下布置，如图（1-10）所示。

2. The chassis part, the exposed connectors, should be arranged downwards as much as possible after the connection is completed, as shown in Figure (1-10).

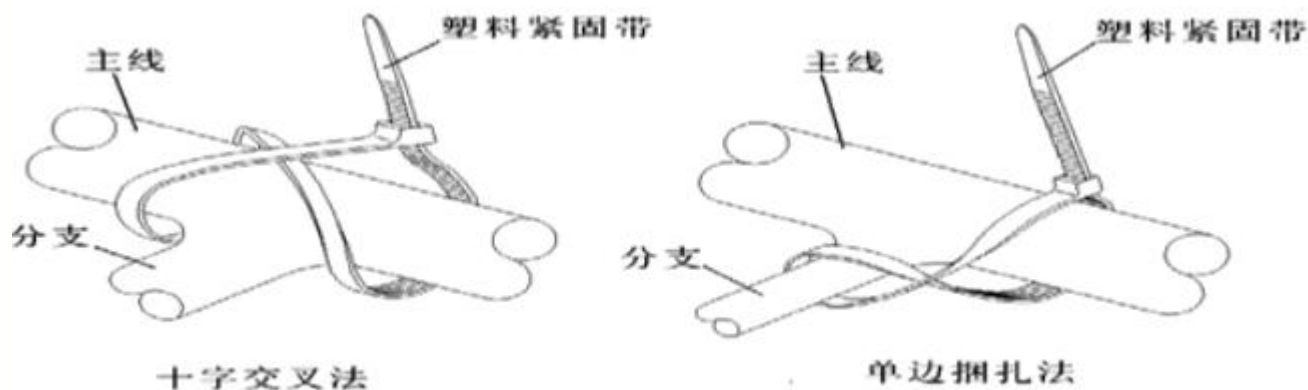


图（1-10）插接器进线方向



## 六、线束的保护和紧固

- 1、线束在敷设过程中，要检查线束表面护套或波纹管有无损坏，有损坏时要进行修复，装配时在出现与金属部件相互摩擦的位置需加装线束保护。
  - 2、在发热元件附近敷设线束时，应尽量远离发热元件捆扎固定（安全距离 $\geq 200\text{mm}$ ）距离过近时需加装隔热保护。
  - 3、驾驶室附加线束沿驾驶室线束敷设好后，用塑料紧固带按常规方法捆扎，不同直径时应使用不同长度的塑料紧固带。若出现分支较多时，在分支处用塑料紧固带采用十字交叉法进行捆扎。分支较少时，在分支处缠绕后在主线束上捆扎。
- 如图（1-11）所示。



图（1-11）捆扎示意图



## 6、 Protection and fastening of wiring harnesses

1. During the laying process of the wire harness, it is necessary to check whether the surface sheath or corrugated pipe of the wire harness is damaged. If there is any damage, it should be repaired. During assembly, wire harness protection should be installed in areas where friction occurs with metal components.
2. When laying wiring harnesses near heating elements, they should be tied and fixed as far away as possible (safety distance  $\geq 200\text{mm}$ ). If the distance is too close, insulation protection should be added.
3. After the additional wiring harness in the cab is laid along the wiring harness, it should be tied with plastic straps according to the conventional method. Different lengths of plastic straps should be used for different diameters. If there are multiple branches, use plastic fastening straps at the branch and tie them using the cross over method. When there are fewer branches, wrap them around the branch and tie them on the main bundle. As shown in Figure (1-11).

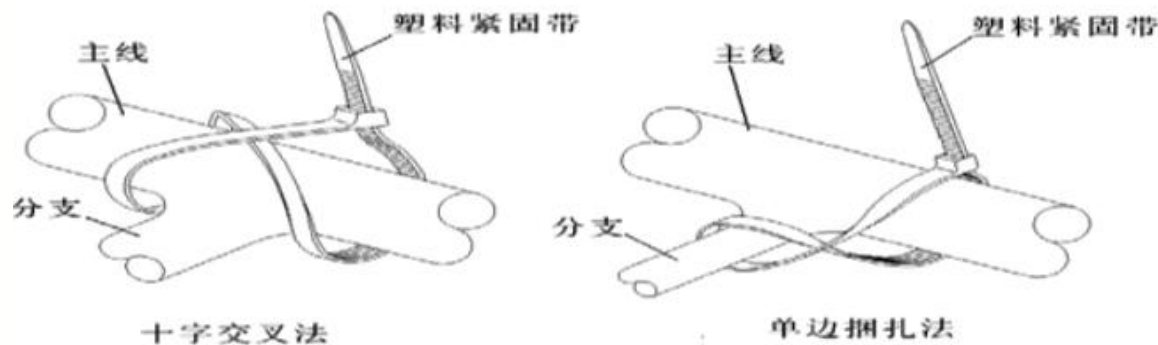


图 (1-11) 捆扎示意图

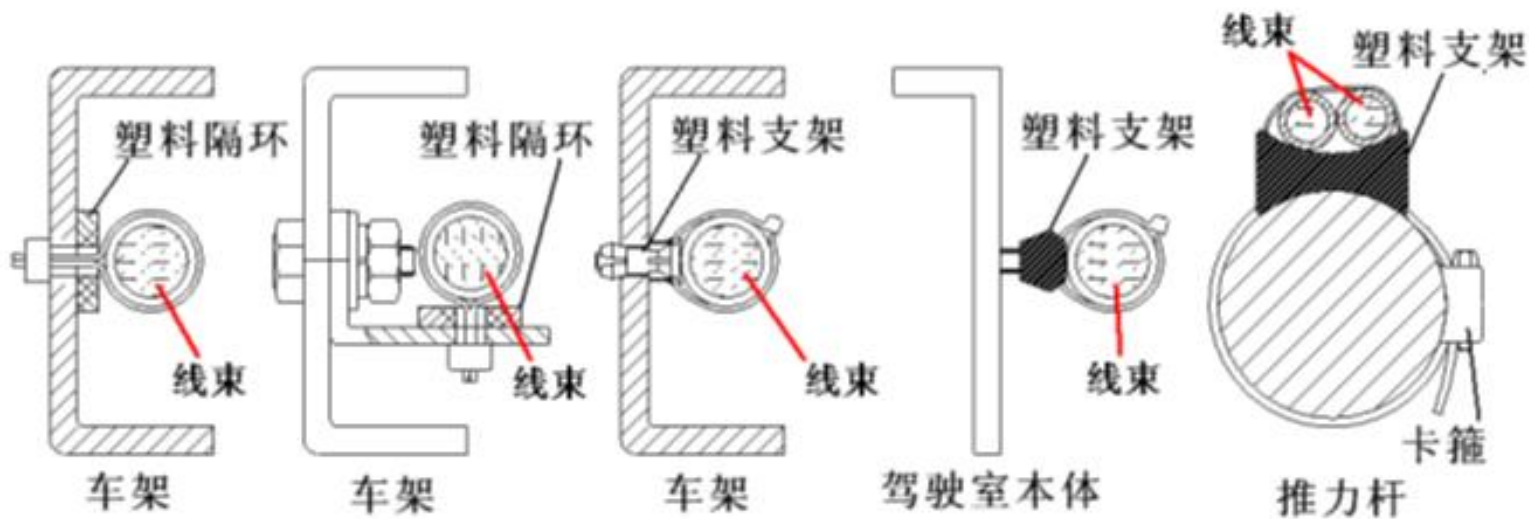


## 六、线束的保护和紧固

### 6、 Protection and fastening of wiring harnesses

4、线束在金属部件上捆扎固定时，须在金属部件与线束之间加装塑料隔环、塑料支架、保护垫等非金属介质，然后再用塑料紧固带固定，如图（1-12）所示。

4. When bundling and fixing wire harnesses on metal components, non-metallic media such as plastic spacers, plastic brackets, and protective pads must be added between the metal components and the wire harness, and then fixed with plastic fastening straps, as shown in Figure (1-12).



图（1-12）装配示意图



## 六、线束的保护和紧固

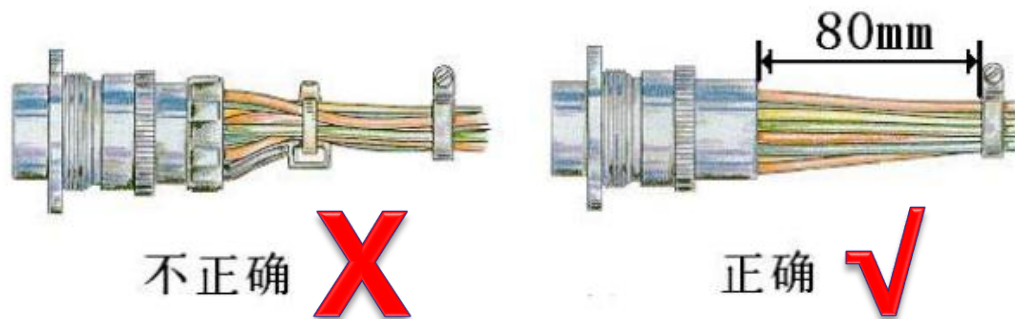
### 6、 Protection and fastening of wiring harness

5、线束敷设、捆扎好后，由于后序装配需要，将捆扎、固定点的塑料紧固带剪开，在工作结束后必须将线束恢复到原来状态。

6、带插接器的线束距离插接器最近的塑料紧固带不能小于80mm，如图（1-13）所示。

5. After the wiring harness is laid and tied, due to the need for subsequent assembly, if the plastic fastening straps must be cut open. After the work is completed, the wiring harness must be restored to its original state.

6. The distance of the plastic fastening tape and the connector should not be less than 80mm, as shown in Figure (1-13).



图（1-13）捆扎示意图

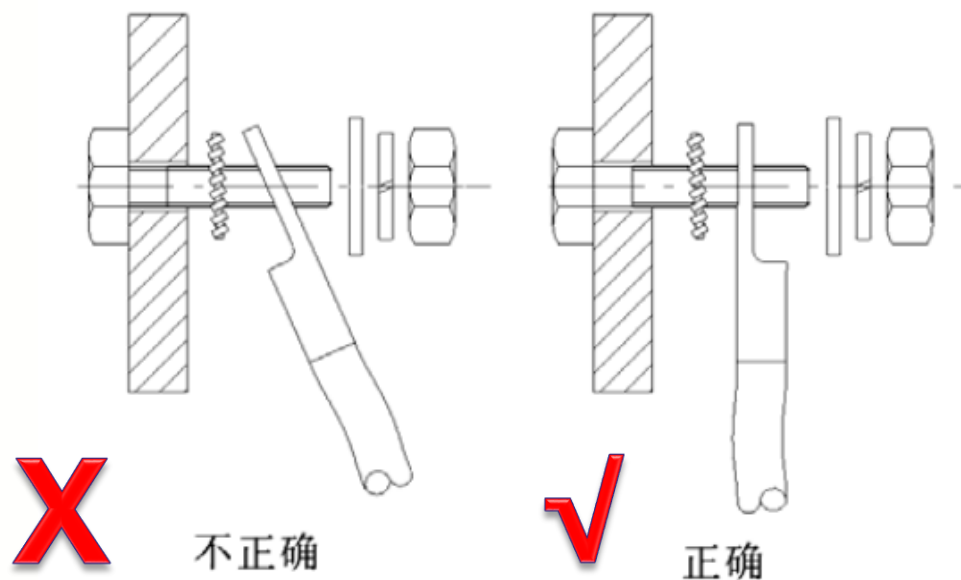


## 六、线束的保护和紧固

### 6、 Protection and fastening of wiring harnesses

7、搭铁线接地时，要将连接件的平面与驾驶室或车架的金属本体接触，如图（1-15）所示，并要在金属本体与搭铁线之间加装齿形垫圈，如图（1-16）所示。

7. When connecting the grounding wire, the flat surface of the connector should be in contact with the metal body of the cab or frame, as shown in Figure (1-15), and a toothed washer should be added between the metal body and the grounding wire, as shown in Figure (1-16).



图（1-15）搭铁线示意图



## 六、线束的保护和紧固

### 6、 Protection and fastening of wiring harnesses

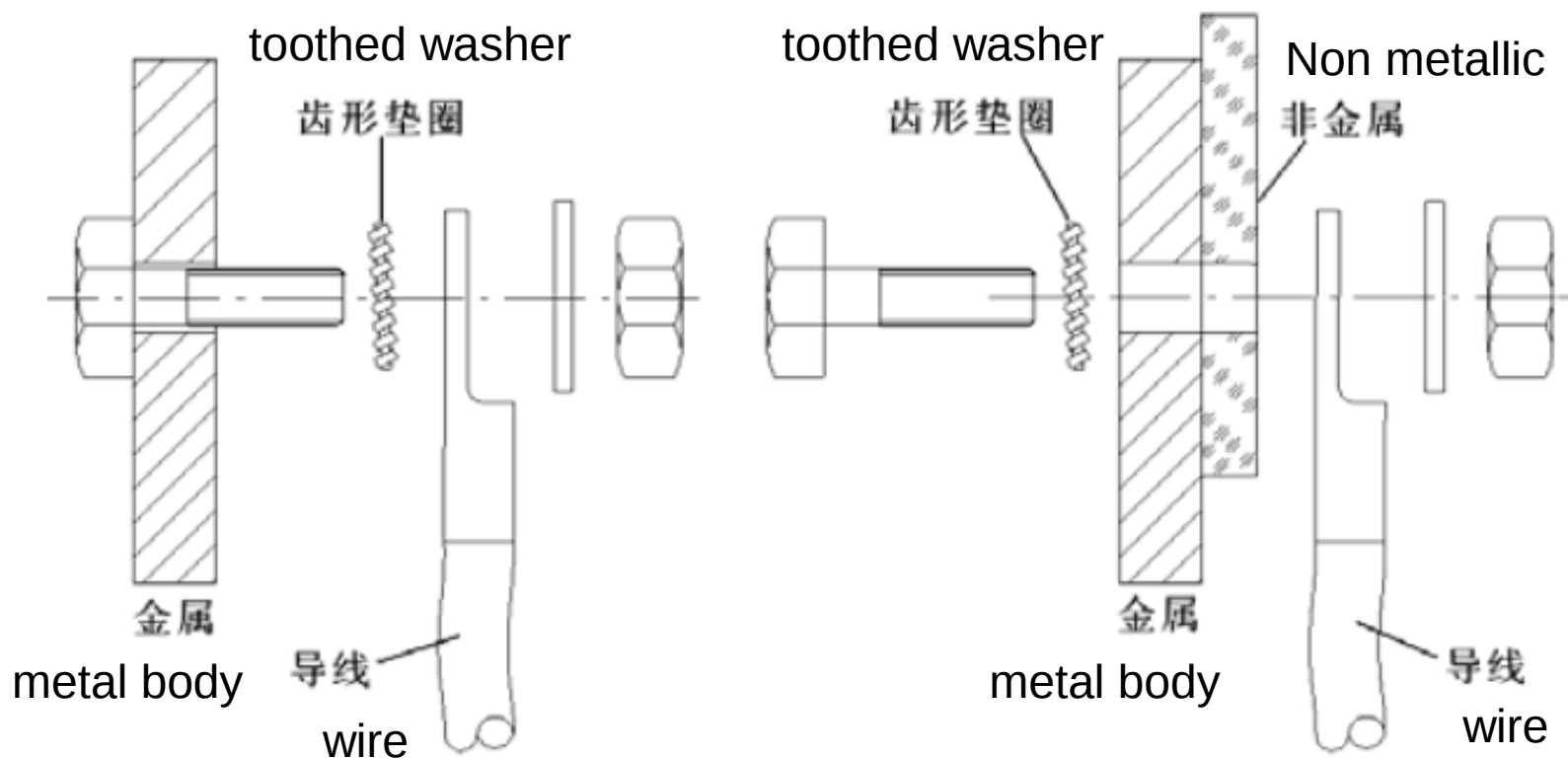


图 (1-16) 搭铁线示意图

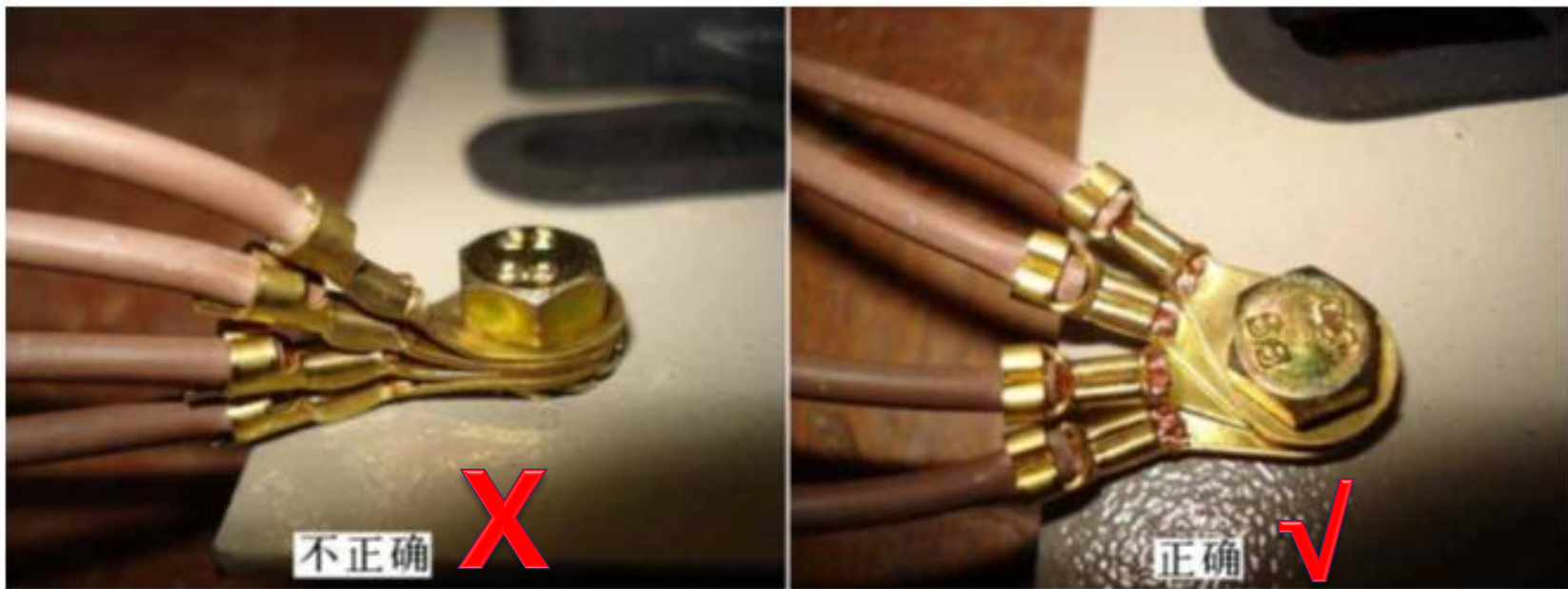


## 六、线束的保护和紧固

### 6、 Protection and fastening of wiring harnesses

8、两根以上搭铁线接地时，连接件之间要互相成角度叠加，不可直接叠加到一起，如图（1-17）所示。

8. When two or more grounding wires are grounded, the connectors should be stacked at an angle to each other and cannot be directly stacked together, as shown in Figure (1-17).



图（1-17）搭铁线装配效果图

