Unit UEEEEE105A
FIX AND SECURE
ELECTROTECHNOLOGY
EQUIPMENT

KS01-EE105A
Class Orientation

Introduction:
- Introduce yourself.
- Welcome to Electrical Trades Miller TAFE.
- Miller is part of SWSI Institute.
- Check enrolment forms.
- Discuss the requirement to carry TAFE Card

General Induction:
- Discuss location of:
  - Toilets
  - Building exits
  - Evacuation area
  - Fire extinguishers
  - First aid
  - Emergency Stop buttons (class room induction)

- Refer to the STUDENT CALENDAR (in front of book) and discuss the following:
  - Use for important dates, exams, holidays etc.
  - Schedule exam make-up dates etc. (only in consultation with the class teacher)

- Refer to the STUDENT CONTACTS page (in front of book) and discuss the following:
  - Head Teachers phone number and office number
  - Teachers phone number and office number
  - College support unit contacts and phone number
  - Other college phone numbers

- Refer to the EVACUATION PLAN and discuss the following:
  - Fire and Bomb threat procedures
  - The evacuation procedure
  - The requirement to check the roll at the evacuation area

- Refer to the COLLEGE MAP and discuss the following:
  - Car parking
  - Canteen & operating hours
  - Phone (in canteen – free for local calls only)
  - Student Association (in canteen area)
  - Library & operating hours
  - Main Office

- Refer to the MINIMUM STUDENT REQUIREMENTS page and discuss the following:
  - Each item listed in the document
  - Break times and punctuality
  - Emphasise employer correspondence for non-adherence
  - Always have required PPE. ie: clear safety glasses, correct footwear etc.
  - Always carry required resources eg: pens, calculators, drawing instruments & standards
Class Orientation

- Refer to the USEFUL LINKS page and discuss the following:
  - Available websites and services
  - Login procedures for varying services and sites
  - Recording of students DEC User ID and Password
  - Procedure for downloading Australian Standards
  - Accessing Moodle courses

- Refer to the EQUATION SHEET and discuss the following:
  - Every new student workbook has an equation sheet
  - Only new / clean equation sheets will be permitted in exams
  - Not all exams require the use of an equation sheet

- Refer to the WORK PERFORMANCE EVIDENCE page and discuss the following:
  - A broad overview of workplace training
  - The need to collect evidence whilst at work
  - Skills Tracker recording – Login details etc.
  - Skills Tracker orientation will be done during the year
  - You cannot course complete without adequate work performance evidence

- Refer to the COURSE OUTLINE and discuss the following:
  - Four year apprenticeship (in general)
  - Three years at TAFE, fourth year in the workplace
  - The IMPORTANCE of evidence collection for Workplace Performance (Skills-tracker)
  - Options for failed units and repeat classes
  - Failing a unit twice

- Refer to the UNIT GUIDE and discuss the following:
  - Prerequisites, and the possible need to repeat a unit or part thereof before advancing
  - Student Assessment Guidelines and signing of guidelines for each unit
  - Consequences for Cheating
  - Contacting the class teacher for missed exams
  - Explain the SAGs assessment table and the timing / weighting of exams
  - Successful completion of a unit is only achieved when a student shows sufficient Essential Knowledge & Associated Skills (EKAS) contained within the unit, whereby;
    - Essential Knowledge is determined by the KS associated with the unit, and
    - Skills are demonstrated by consistent performance across a representative range of contexts.

  NOTE: Evidence of skills may be collected in a number of ways. Examples include:
  - Skills-tracker portfolios
  - Workbook UNIT portfolios
  - In class simulated workplace activities, documented in the class roll by the teacher
  - A combination of all of the above.

Tour of Campus: - For new classes, visit required locations listed above
Minimum Student Requirements

Electrical Trades Section - Chullora

1. **SHOES / PPE**
   Fully enclosed leather-top shoes must be worn at all times in all parts of the building. **Definitely no thongs or sandals.**

2. **ATTIRE**
   Clean tidy clothing is required. Tops are required to have sleeves. **No singlet-style tops.**

3. **EYES / PPE**
   **Clear, non-tinted safety glasses** must be provided by the student and worn where required e.g. workshop classes.

4. **BOOKS**
   Each student must have his/her own text, tutorial and workbooks as well as any required accessories e.g. pens, drawing instruments, calculator, AS3000 rule book.

5. **ATTENDANCE**
   Students are expected to be punctual and attend classes for the entire duration. In the event of not being able to attend a class or classes, the student should inform the class teacher and their employer.

   Non-attendances will result in employers being notified.

6. **ASSESSMENTS**
   Students that miss exams for ANY reason must where possible contact their class teacher beforehand. Acceptable supporting evidence as to why the exam was missed MUST be provided.

   e.g. doctor certificate for illness. Refer to the ‘student assessment guidelines’ for further important information.

   - ‘SCHOOLIES’ is not an acceptable reason to miss exams.
   - Cheating and Plagiarism will not be tolerated

7. **SMOKING**
   Smoking is not permitted on the College grounds at any time except in designated areas

8. **EATING**
   The consumption of food or drink is not permitted in any part of any building within the College (with the exception of the College Canteen).

9. **MOBILE PHONES**
   **Mobile phones are to be turned off** prior to entering any classroom, workshop or wiring room. Mobile phones are not to be accessed during class.

10. **DISCIPLINE**
    Students must be familiar with, and adhere to, the Code of Conduct which is printed in the Student Handbook that is available from the main office.
## Useful Links

| **Skills-Tracker** | www.skills-tracker.com | An online resource used by individuals to gather and record their work performance evidence. Chullora student access information:  
**LOGIN:** your student number.  
**PASSWORD:** your surname (in lower case letters). |
| --- | --- | --- |
| **Email:** info@skills-tracker.com  
**Phone:** +612 9543 1100 | | |
| **Miller Electrical WIKI space** | http://electricaltrades-miller.swsi.wikispaces.net | Find information about enrolments, calendars, contacts, help with maths, work performance evidence databases and lots more. |
| **Moodle** | http://swsi.moodle.tafensw.edu.au | Access unit information for some classes (see your teacher). You may also need a specific ‘enrolment key’ to access your teachers class work on Moodle.  
**LOGIN:** your DEC Username  
**PASSWORD:** your DEC password |
| **South Western Sydney Institute of TAFE** | www.swsi.tafensw.edu.au | Find information about enrolments, college contacts and locations, courses, additional services and much more. |
| **TAFE NSW Website** | https://www.tafensw.edu.au | Find information about courses, colleges, assessment, a range of student services, career advice, and much more.  
**NOTE:** Log onto student ‘eServices’ to find results etc. Click on the ‘student login’ link.  
**LOGIN:** your DEC Username  
**PASSWORD:** your DEC password |
Vocational Training Tribunal (VTT) – 02 9266 8450 | For information regarding Skills Recognition, Craft Certificates, Certificates of Proficiency (COP), check apprenticeship registrations, access to Australian apprenticeship support services etc. |
| **NSW Industrial Relations** | www.industrialrelations.nsw.gov.au | Find information for pay rates, long service and general award conditions. |

### USE THIS SPACE TO RECORD LOGIN DETAILS FOR SPECIFIC SITES

<table>
<thead>
<tr>
<th><strong>Password to log on to the TAFE computers</strong></th>
<th><strong>Password to log on to the Internet at TAFE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User name:</strong> MIFG15-11 (e.g. ONLY)</td>
<td><strong>User name:</strong> Your DEC User ID</td>
</tr>
<tr>
<td><strong>Password:</strong> tafestudent (all one word)</td>
<td><strong>Password:</strong> Your DEC password</td>
</tr>
<tr>
<td><strong>Log on to:</strong> SOUTH_WESTERN</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Password to log on for library resources</strong></th>
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<tbody>
<tr>
<td><strong>User ID:</strong></td>
</tr>
<tr>
<td><strong>Password:</strong></td>
</tr>
</tbody>
</table>

* It is strongly suggested that you record your User ID and password somewhere secure. Such as in your phone.
## Useful Links

### How to access Standards Online Premium

Access to SAI Global to download AS/NZS 3000 and other AS Standards.


2. Left click on Standards Online Indexes

3. Consult library staff for this years’ User ID and Password

4. Left click on Standards Online Indexes

5. Type in the Standard that you want to access
   
   **Examples:**
   - AS/NZS 3008.1.1
   - AS/NZS 3000:2007

6. From the search results, click on the required standard. You can open and view the file.

   **Saved files expire after 2 days**

**Library staff can also assist you to access Standards Online Premium on library computers**
Useful Links

How to access Moodle

The following is a guide to login to Moodle from an external computer (example: from home).

If you are accessing Moodle from a TAFE computer, you will need to login to the TAFE computer first. See the instructions on the first page of ‘Useful Links’.

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
</tr>
</thead>
</table>
| 2.   | Login using your portal username and password.  
      Note: This is your DEC Username and password. |
| 3.   | New users – search for the course name (or part thereof) given to you by your class teacher. 
      Example: ‘UEENEEE101A’ or ‘OHS’ |
| 4.   | If multiple courses of the same name appear, be sure to select the course name ending in ‘-mi’ for Miller TAFE. 
      Left click to enter course |
| 5.   | Enter the enrolment key as given to you by your class teacher. 
      Left click on the ‘Enrol me’ icon and access your course material. |
| 6.   | Existing or returning users – left click on the ‘My home’ tab to see your previously registered courses. Access your course as per step 4. No enrolment key required. |
### Stage 1: This list does not contain all equations in the course and transposition may be required.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$Q = It$</td>
<td>$F = ma$</td>
<td>$W = Pt$</td>
<td>$W = Fs$</td>
<td>$W = mgh$</td>
</tr>
<tr>
<td>2</td>
<td>$V = IR$</td>
<td>$I = \frac{V}{R}$</td>
<td>$R = \frac{V}{I}$</td>
<td></td>
<td>$P = \frac{2\pi n T}{60}$</td>
</tr>
<tr>
<td>3</td>
<td>$P = VI$</td>
<td>$P = I^2R$</td>
<td>$P = \frac{V^2}{R}$</td>
<td></td>
<td>$\eta% = \frac{\text{output}}{\text{input}} \times \frac{100}{1}$</td>
</tr>
<tr>
<td>4</td>
<td>$R = \frac{\rho l}{A}$</td>
<td>$R_2 = \frac{R_1 A_1 l_2}{A_2 l_1}$</td>
<td>$R_n = R_c(1 + \alpha \Delta t)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>$V_T = V_1 + V_2 + V_3$</td>
<td>$R_T = R_1 + R_2 + R_3$</td>
<td>$I_T = I_1 = I_2 = I_3$</td>
<td>$V_1 = V_T \frac{R_1}{R_1 + R_2}$</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>$V_T = V_1 = V_2 = V_3$</td>
<td>$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$</td>
<td>$I_T = I_1 + I_2 + I_3$</td>
<td>$I_2 = I_T \frac{R_1}{R_1 + R_2}$</td>
<td>$R_T = \frac{R_1 R_2}{R_1 + R_2}$</td>
</tr>
<tr>
<td>7</td>
<td>$C = \frac{Q}{V}$</td>
<td>$C = \frac{A \varepsilon_d \varepsilon_r}{d}$</td>
<td>$\tau = RC$</td>
<td>$C_T = C_1 + C_2 + C_3$</td>
<td>$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$</td>
</tr>
<tr>
<td>8</td>
<td>$L = N \frac{\Delta \phi}{\Delta t}$</td>
<td>$L = \frac{N^2}{S}$</td>
<td>$\tau = \frac{L}{R}$</td>
<td>$V = N \frac{\Delta \phi}{\Delta t}$</td>
<td>$V = L \frac{\Delta I}{\Delta t}$</td>
</tr>
<tr>
<td>9</td>
<td>$e = Blv$</td>
<td>$F = Bil$</td>
<td>$F_m = IN$</td>
<td>$B = \frac{\phi}{A}$</td>
<td>$S = \frac{l}{\mu_0 \mu_r A}$</td>
</tr>
<tr>
<td>10</td>
<td>$E_g = k\phi n$</td>
<td>$T = k\phi I_a$</td>
<td>$T = Fr$</td>
<td>$H = \frac{F_m}{l}$</td>
<td>$\phi = \frac{F_m}{S}$</td>
</tr>
</tbody>
</table>
**Stage 2:** This list does not contain all equations in the course and transposition may be required.

**Stage 1:** equations are also used during stage 2

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>(V_{\text{ave}} = 0.637V_{\text{max}})</td>
<td>(V_{\text{RMS}} = 0.707V_{\text{max}})</td>
<td>(v = V_{\text{max}} \sin \theta)</td>
<td>(V_L = \sqrt{3}V_P)</td>
</tr>
<tr>
<td>12</td>
<td>(I_{\text{ave}} = 0.637I_{\text{max}})</td>
<td>(I_{\text{RMS}} = 0.707I_{\text{max}})</td>
<td>(i = I_{\text{max}} \sin \theta)</td>
<td>(I_L = \sqrt{3}I_P)</td>
</tr>
<tr>
<td>13</td>
<td>(I = \frac{V}{Z})</td>
<td>(V = IZ)</td>
<td>(Z = \frac{V}{I})</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>(Z = \sqrt{R^2 + X^2})</td>
<td>(Z = \sqrt{R^2 + (X_L - X_C)^2})</td>
<td>(X_L = 2\pi fL)</td>
<td>(X_C = \frac{1}{2\pi fC})</td>
</tr>
<tr>
<td>15</td>
<td>(P = VI \cos \theta)</td>
<td>(S = VI)</td>
<td>(Q = VI \sin \theta)</td>
<td>(P = \sqrt{S^2 - Q^2})</td>
</tr>
<tr>
<td>16</td>
<td>(P = \sqrt{3}V_L I_L \cos \theta)</td>
<td>(S = \sqrt{3}V_L I_L)</td>
<td>(Q = \sqrt{3}V_L I_L \sin \theta)</td>
<td>(\tan \theta = \sqrt{3} \left( \frac{W_1 - W_2}{W_1 + W_2} \right))</td>
</tr>
<tr>
<td>17</td>
<td>(V' = 4.44\Phi fN)</td>
<td>(V_1 = \frac{N_1}{N_2})</td>
<td>(I_2 = \frac{N_1}{N_2})</td>
<td>(V_{\text{reg}}% = \frac{(V_{NL} - V_{FL})}{V_{FL}} \times 100)</td>
</tr>
<tr>
<td>18</td>
<td>(N_{\text{syn}} = \frac{120f}{P})</td>
<td>(f_r = \frac{100}{S%} \times f)</td>
<td>(S% = \left( \frac{n_{\text{syn}} - n}{n_{\text{syn}}} \right) \times \frac{100}{1})</td>
<td>(V_{\text{reg}}% = \frac{(V_{NL} - V_{FL})}{V_{NL}} \times 100)</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

\(P = \frac{2\pi nT}{60}\)

\(\eta \% = \frac{\text{output}}{\text{input}} \times \frac{100}{1}\)
**Stage 2a:** This list does not contain all equations in the course and transposition may be required.

**Stage 1:** equations are also used during stage 2

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>$V_T = E_g - (I R_i)$</td>
<td>$E = \frac{F}{A}$</td>
<td>$E = \frac{I}{d^2}$</td>
<td>$E = \frac{I}{d^2} \times \cos \theta$</td>
<td>$\eta = \frac{F}{P}$</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td>$Q_c = P(\tan \theta_1 - \tan \theta_2)$</td>
<td>$X_c = R(\tan \theta_1 - \tan \theta_2)$</td>
<td></td>
<td></td>
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<tr>
<td>24</td>
<td></td>
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</tbody>
</table>

**Stage 3:** This list does not contain all equations in the course and transposition may be required.

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<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>$V_p Y = 57.7% V_p \Delta$</td>
<td>$I_p Y = 57.7% I_p \Delta$</td>
<td>$I_{motor \ st} = \left(\frac{% TAP}{100}\right) \times I_{DOL}$</td>
<td>$I_{line \ st} = \left(\frac{% TAP}{100}\right)^2 \times I_{DOL}$</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>$I_{ST} = \frac{1}{3} \times I_{DOL}$</td>
<td>$T_{ST} = \frac{1}{3} \times T_{DOL}$</td>
<td>$V_{st} = \left(\frac{% TAP}{100}\right) \times V_{DOL}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>$I_{ST} = \left(\frac{V_{st}}{V}\right) \times I_{DOL}$</td>
<td>$T_{ST} = \left(\frac{V_{st}}{V}\right)^2 \times T_{DOL}$</td>
<td>Constant $= \frac{V}{f}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
IMPORTANT:
Students should bring this to the attention of their employers as soon as possible.

Work Performance Evidence is required to be collected for each unit of study. This evidence is used to help measure the effectiveness of your learning and to demonstrate that the required work related practical skills have been obtained and used to consolidate the academic component of your study. That is, you possess both the theory knowledge AND practical ability to complete a task to a competent level.

For some units of study, your class teacher will collect this evidence on your behalf by setting tasks that realistically ‘simulate’ the workplace environment. The college will record and store this information. You should confirm with your class teacher at the commencement of each new unit of study whether he or she is going to collect work performance evidence on your behalf.

However, for the most part, YOU will be required to collect the evidence that demonstrates your progress in the workplace and that the required electro-technology skills are being achieved.

The electrical trades section of Chullora TAFE has set-up on your behalf a ‘Skills-Tracker’ online portfolio account for you to collect and record all of your workplace learning. In due time, you will be given instruction and tuition on the use of the Skills-Tracker portfolio system.
In the meantime, log onto www.skills-tracker.com and have a look at the ‘learner guides’ and ‘supervisor guides’ found in the ‘downloads’ tab of the navigation bar.

Skills-Tracker
www_skills-tracker.com
Email: info@skills-tracker.com
Phone: +612 9543 1100

Chullora student access information:
LOGIN: your student number.
PASSWORD: your surname (in lower case letters).

Note: Units that require you to collect WPE by the Skills-tracker portfolio will show a NC (Not Yet Competent) result on your transcript until your portfolio is complete and verified by the college. This will be the case even if you have passed all of your in class assessments. In most cases, the NC result will not be updated to a unit pass result of AC (Achieved Competence) until your work evidence portfolio is checked and verified toward the end of your course / apprenticeship.

***** REMEMBER *****
YOU are responsible for collecting your own workplace evidence
<table>
<thead>
<tr>
<th>Stage or Year</th>
<th>Term 1</th>
<th>Term 2</th>
<th>Year</th>
<th>Term 3</th>
<th>Term 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competency Units</strong></td>
<td>Solve problems in 600V circuits</td>
<td>UEENEE104A</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>72 hours - 18 weeks at 4 hours per week.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competency Units</strong></td>
<td>Occupational Health Safety regulations, codes</td>
<td>UEENEE101A 18 hours</td>
<td>22</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Fabricate, dismantle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>assemblage of utilities wiring components</td>
<td>UEENEE102A 18 hours</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Test and ensure electrical equipment</td>
<td>UEENEE108A 18 hours</td>
<td>28</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>36 hours - 3 weeks at 4 hours per week.</td>
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<tr>
<td><strong>Semester 2</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competency Units</strong></td>
<td>Solve problems in low voltage 600V circuits</td>
<td>UEENEE109A</td>
<td>31</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>72 hours - 18 weeks at 4 hours per week.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competency Units</strong></td>
<td>Solve problems in single and three phase low voltage electrical apparatus and circuits</td>
<td>UEENEE110A</td>
<td>34</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>36 hours - 3 weeks at 4 hours per week.</td>
<td></td>
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<td></td>
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<tr>
<td><strong>Semester 3</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Competency Units</strong></td>
<td>Develop and connect electrical control circuits</td>
<td>UEENEE111A</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>72 hours - 18 weeks at 4 hours per week.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competency Units</strong></td>
<td>Select wiring systems and cables for low voltage general electrical installations</td>
<td>UEENEE112A</td>
<td>22</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>54 hours - 18 weeks at 3 hours per week.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Install low voltage wiring and accessories</td>
<td>UEENEE113A 16 hours</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>36 hours - 3 weeks at 4 hours per week.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Semester 4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competency Units</strong></td>
<td>Complete work experience profiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply for Capstone Assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competency Units</strong></td>
<td>Verify compliance and functionality of low voltage general electrical installations</td>
<td>UEENEE114A 16 hours</td>
<td>28</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Capstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use this course outline to help track your progress. Mark off each unit as you pass it.
FULL unit guides can be accessed online at www.training.gov.au

The following information is summarised and is intended to provide a broad overview only.

Unit:
UEENEEE105A Fix and secure electrotechnology equipment

Unit Descriptor
This unit covers fixing, securing and mounting techniques as apply in the various electrotechnology work functions. It encompasses the safe use of hand and portable power tools, safe lifting techniques, safe use of ladders and elevated platforms and the selection and safe application of fixing devices and supporting accessories/equipment.

Pre-Requisites
Pre-requisites are units of study that must be completed prior to commencing a new unit of study. That is, you must pass subject ‘X’ before you are allowed to commence subject ‘Y’. In some instances, pre-requisite units may be studied concurrently with new units of study.

Pre-requisites for this unit of study are:
- UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace
**Literacy and numeracy skills indicators for this unit – NRS Level 3:**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills at a level indicated by the following NRS levels.

The National Reporting System (NRS) is a nationally recognised mechanism for determining adult English language, literacy and numeracy levels.

In context for this unit of study these Indicators of Competence (IoC) are not an assessment system, but merely a guide to the specific reading writing and numeracy levels for this unit.

Further information pertaining to the description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy', of the UEE11 training package, available at [http://training.gov.au](http://training.gov.au)

<table>
<thead>
<tr>
<th>Skill</th>
<th>IoC</th>
<th>Indicator of Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading: Level 3</td>
<td>3.1</td>
<td>Reads and interprets texts of some complexity, integrating (where relevant) a number of pieces of information in order to generate meaning.</td>
</tr>
<tr>
<td></td>
<td>3.2</td>
<td>Displays awareness of purpose of text, including unstated meaning.</td>
</tr>
<tr>
<td></td>
<td>3.3</td>
<td>Interprets and extrapolates from texts containing data which is unambiguously presented in graphic, diagrammatic, formatted or visual form.</td>
</tr>
<tr>
<td>Writing: Level 3</td>
<td>3.4</td>
<td>Communicates relationships between ideas through selecting and using grammatical structures and notations, which are appropriate to the purpose.</td>
</tr>
<tr>
<td></td>
<td>3.5</td>
<td>Produces and sequences paragraphs according to purpose of text.</td>
</tr>
<tr>
<td>Numeracy: Level 3</td>
<td>3.10</td>
<td>Selects appropriate mathematical information embedded in a real life activity, item or text</td>
</tr>
<tr>
<td></td>
<td>3.11</td>
<td>Selects and applies a range of mathematical strategies to solve problems in a number of contexts which are familiar and may be interrelated.</td>
</tr>
<tr>
<td></td>
<td>3.12</td>
<td>Reflects on and questions reasonableness and appropriateness of the purpose, process and outcomes of a mathematical activity.</td>
</tr>
<tr>
<td></td>
<td>3.13</td>
<td>Uses oral and written informal and formal language and representation including symbols and diagrams to communicate mathematically.</td>
</tr>
</tbody>
</table>
Student Assessment Guidelines – (SAG’s)

Assessment is an important part of learning at TAFE NSW.

TAFE NSW provides comprehensive information for students regarding assessment. A copy of ‘Every Student’s Guide to Assessment in TAFE NSW’ can be obtained by visiting:


The following information provided in this workbook is to assist you in your understanding of the assessment process, by providing and overview of assessment for this unit. Any questions regarding assessment can be addressed by your class teacher.

Course: National Course Code: UEE30811

Qualification and name: Certificate III in Electrotechnology Electrician

TAFE NSW course number: 30811. Version: 3

Requirements to receive the qualification:

To achieve UEE30811 Certificate III in Electrotechnology, learners are required to complete all units from the core and elective units to a weight of 140 points. Core and elective units are shown in the ‘Course Outline’ contained in the preceding pages of this workbook.

Recognition: If you have completed other relevant training you may be eligible to have units of competency from previous training counted towards completion for this course. Talk to your teacher or head teacher if you think you may be eligible for recognition for units previously completed.

Learner Support: Students who require support to meet their learning goals should discuss their options by talking to their teacher or Teacher/Consultant for students with a disability.

Assessment Results: Results will be made available to you by your class teacher after each assessment event. Results may also be viewed online (final unit results only) by visiting TAFE ‘eServices’. See the ‘Useful Links’ on the ‘student contacts’ page in the front of this workbook for further information on TAFE eServices. Concerns you may have about your assessment results should be addressed to your class teacher within 3 weeks of receiving a result.
Meeting Competency Requirements:

In order to be deemed ‘competent’ in a unit of study, you will be required to achieve a minimum Knowledge and Skills (KS) percentile mark AND satisfactorily complete the Work Performance Evidence (WPE) requirements (ie: Skills-tracker or in-class evidence collected by your teacher). In all other cases participants will be deemed as ‘not yet competent’ (NC).

Units in this course are ungraded. Your TAFE transcript will record your result as follows:

- **AC** - A Unit result code of **AC** (achieve competency) will be issued if all associated KS specification(s) and work performance evidence have been passed and/or completed.
- **NC** - A Unit result code of **NC** (not yet competent) will be issued if either the KS specification or work performance evidence has not been passed and/or completed.

**Note:** Units that require you to collect WPE by the Skills-tracker portfolio will show a NC result on your transcript until your portfolio is complete and verified by the college. In most cases this will not be done until you approach the end of your course / apprenticeship.

Assessment Events:

Assessment events are varying methods of assessment used to collect information and measure an individual’s level of learning. Below is a table listing typical event methods.

<table>
<thead>
<tr>
<th>Assessment Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>May consist of multiple choice questions, short answer questions, descriptive questions, calculations and diagram completion questions</td>
</tr>
<tr>
<td>Tutorial</td>
<td>May consist of section review questions, projects, class assignments, research etc.</td>
</tr>
<tr>
<td>Skills Practice</td>
<td>May consist of diagram completion questions, circuit and component connections, motor connections, cabling connections, safe isolation procedures, meter and test equipment connections and measurements and the like</td>
</tr>
<tr>
<td>Practical Exam</td>
<td>May consist of diagram completion questions, circuit and component connections, motor connections, cabling connections, safe isolation procedures, meter and test equipment connections and measurements and the like</td>
</tr>
<tr>
<td>Theory Exam</td>
<td>May consist of multiple choice questions, short answer questions, descriptive questions, calculations and diagram completion questions</td>
</tr>
<tr>
<td>Work Performance Evidence:</td>
<td>May consist of actual workplace evidence collected and recorded by profiling (eg: skill-tracker) or simulated workplace evidence collected in the classroom by your teacher or a combination of both</td>
</tr>
</tbody>
</table>

Assessment events used in this particular unit of study are ‘weighted’ and shown on the following page.
**Required skills and knowledge**

This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices, rationale and solving problems in the relevant unit. The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

View the section title page in your class workbook or the complete unit guide for a full list of the fundamentals covered by each topic within this unit.

Below is a list only indicating the topic areas to be covered by the required skills and knowledge specification for this unit:

**Note:** Topics may not be delivered in the order indicated by this list.

Additional information pertinent to your learning may also be included during unit delivery.

**KS01-EE105A – Fixing and support devices/techniques**

<table>
<thead>
<tr>
<th>WORKBOOK SECTION NUMBER</th>
<th>CONTENT</th>
<th>TOPIC NUMBER AS LISTED IN THE FULL UNIT GUIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1</td>
<td><strong>Device for securing and mounting</strong> electrical / electronic / instrumentation / refrigeration / air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to hollow walls</td>
<td>T1</td>
</tr>
<tr>
<td>Section 2</td>
<td><strong>Device for securing and mounting</strong> electrical / electronic / instrumentation / refrigeration / air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to solid walls</td>
<td>T2</td>
</tr>
<tr>
<td>Section 3</td>
<td><strong>Device for securing and mounting</strong> electrical / electronic / instrumentation / refrigeration / air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to metal fixing</td>
<td>T3</td>
</tr>
<tr>
<td>Section 4</td>
<td><strong>Securing and mounting</strong> electrical / electronic / instrumentation / refrigeration / air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories using fixing adhesives and tapes</td>
<td>T4</td>
</tr>
</tbody>
</table>
### Student Assessment Guide for this unit:

Evidence for competence in this unit shall be considered holistically. The required skills and knowledge relating to this unit will be assessed in following manner:

<table>
<thead>
<tr>
<th>Event #</th>
<th>Event Name / Timing / Duration</th>
<th>Evidence Method</th>
<th>Wgt.</th>
<th>Out Of %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quiz - Weekly</td>
<td>Formative Assessment</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Tutorial - Weekly</td>
<td>Formative Assessment</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Skills Practice - Weekly</td>
<td>Formative Assessment</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Practical exam - After Section 4 - 1 Hr</td>
<td>Formative Assessment</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Theory Exam 1 - After Section 4 - 1 Hr - MUST PASS 60%</td>
<td>Summative Assessment</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>Work Performance Evidence (Pass / Fail)</td>
<td>Profiling / Skills Tracker</td>
<td>P/F</td>
<td></td>
</tr>
</tbody>
</table>

- **KS MARK**
- **WPE**
- **AC / NC**

* ALL 'MUST PASS' events must be passed AND Total Cumulative KS mark must be 60% or greater

* Work Performance Evidence (WPE) has been reviewed and satisfies requirements (Pass / Fail)

* Final Competency Result (AC) Achieved competency OR (NC) Not Yet Competent. See note below.

**Note:** Only award AC if ALL "MUST PASS' events are passed, KS mark 60% or greater AND WPE is Passed
**Absence from a class assessment:**

All students are expected to sit class assessments at the normal scheduled time.

If due to ill health or other unforeseen and acceptable circumstances you are not able to attend a scheduled class test, it is **your responsibility** to make contact with your class teacher or the section head teacher and inform them of your reason for missing the assessment.

**NOTE:** This contact must be made, prior to, but certainly no later than 24 hours after the scheduled assessment.

Failure to contact the class teacher or section head teacher within the specified time will be taken as your withdrawal from the assessment and a **zero mark** will be recorded.

‘Schoolies’ is not an acceptable reason to miss an assessment. Zero marks will be recorded.

Your Class Teachers Name: ____________________________
Your Class Teachers Phone No: _________________________
Or Head Teachers No: 9825-7398 or 9825-7389 Fax No: 9825-7470

**Workplace Health and Safety (WHS):**

The laws protecting the Health and Safety of people at work apply to students who attend TAFE Colleges, either part time or full time. These laws emphasise the need to take reasonable steps to eliminate or control risk at work (this includes a TAFE College). TAFE NSW has the responsibility for the control, and where possible, the elimination of health and safety risk at the college. This includes bullying and harassment. You are encouraged to help in eliminating hazards by reporting to your teacher or other College staff, anything that you think may be a risk to you or other people.

Your teacher will encourage you to assist in hazard identification and elimination, and to devise control measures for any risks to yourself and other people that may arise during practical exercises. The WHS Act 2011 requires that teachers and students take reasonable steps to control and monitor risk in the classroom, workshop or workplace.

*Individuals failing to observe and follow ALL Workplace Health and Safety requirements in any part of the college, not limited to but including, hall-ways, class rooms, laboratories, wiring rooms and workshops will be promptly removed for their own safety and for the safety of others. Breaches will be recorded on your TAFE record.*
Hollow wall fixing and support

TO ACHIEVE THE PURPOSE OF THIS SECTION:
At the end of this section the student will be able to:

- types and safe application of devices for hollow wall fixing and support

- methods/techniques used to fix/support to wood, hollow wall, masonry blocks, plasterboard, panelling

- types and safe application of fixing devices used in the electrotechnology industry for wood and hollow wall structures (wood screws, coach bolts, self-tappers, self drilling, metal thread, hollow wall anchors, behind plaster brackets, stud brackets, plasterboard devices, toggle devices)

- types of tools used for hollow wall fixing and supporting. using various fixing methods to fix/support to hollow walls.

- Using various fixing methods to fix/ support to hollow walls
Stud, partition and hollow walls

Walls constructed of timber or metal studwork covered with plasterboard or other sheeting material require different fixing techniques. To fix to a hollow wall locate the studs within the wall and line up the fixing points with these. To locate them use a stud finder, or gently tap the surface until you hear a muffled sound indicating the presence of solid timber behind.

Always check that there are no cables or pipes hidden in the wall beneath the area.

The screws for fixing the item may then simply be driven through the plasterboard and into the studs providing a very secure fixing.

Plasterboard screws are commonly used for this type of fixing. They feature a bugle shaped head that countersinks neatly into plasterboard without crushing the core, or tearing the face paper.

For general fixing to timber and thin steel up to 0.6mm thick, e.g., walls and ceilings, partitions, etc.

For fixing plasterboard to steel from 0.8mm to 2.5mm thickness

Coach Bolts are used for heavy-duty fixings to timber. They have a hexagon head and therefore need a spanner to tighten them.

If it is not practical to attach to a stud special hollow wall fixings will be required. Ordinary solid wall plugs will not do since they rely on expansion force within the wall material. Remember that you are relying only on the strength of plasterboard to carry the load; so heavy items cannot be fixed in this way.
**Typical types of plug for hollow wall fixing**

There are many different hollow wall fixings available so you will need to check out their suitability for your particular situation. Some include:

**Threaded wallboard anchors**

These are self drilling anchors suitable for attaching light weight fittings to hollow wall materials such as plasterboard and thin wall panelling. It has a Phillips recessed head, a tapered body and a large widely spaced spiral thread. Once screwed into the plasterboard a screw is then used to attach the fixing.

**Toggle anchor**

This style is a self drilling and uses a moving toggle to provide clamping force against the inside of the plasterboard. The anchor is screwed into the board and then a self tapping screw is inserted and tightened on the swing toggle which is drawn to the inside of the plasterboard to clamp it in place.

**Spring toggle anchor**

One type of these anchors has two spring loaded arms that flip out when the anchor is inserted through the mounting hole and press against the inner face of the board when the screw is tightened.

The second type relies on gravity for the toggle to hang square to the thread, then the screw is tightened onto the board. In both cases the toggle is lost if the screw is undone.

The hole size drilled must be large enough to allow the toggle to pass.
Hollow wall anchors
These have collapsing legs that expand when the anchor is pushed into the hole and the barbed head is tapped into the board surface. The screw can be removed without loosing the anchor, once it has been seated and the anchor expanded.

Nylon toggle anchors
This type is a one-piece, light duty nylon anchor suitable for cavity or solid wall applications.

Providing extra support for heavy fixtures
If it is necessary to fix a heavier item to a hollow wall, a more permanent method must be devised to offer support. Where the timbers do not line up with the fixings, a suitably sized timber nogging can be used to bridge between them. It must be sufficiently strong to support the weight of the item to be fixed.

Always check that there are no cables or pipes hidden in the wall beneath the area to be drilled.
Cutting the stud wall

Locate the timber studwork in the wall and determine across which ones you are going to span with the bridging timber.

Position the batten on the wall and mark around it.

Drill through the plasterboard at the corner of the outline and, using a padsaw, cut out the marked section. As you reach each of the timbers behind, you may find it easier to use a sharp craft knife to cut the plasterboard rather than the padsaw.

Insert the nogging, fixing in place with screws or nails, replace the plasterboard and, if necessary, re-plaster the damage done to the wall.
Practical exercise Hollow wall fixing

Skills & Knowledge
Group T1
- types and safe application of devices for hollow wall fixing and support
- methods/techniques used to fix/support to hollow wall, plasterboard, panelling
- types and safe application of fixing devices used in the electrotechnology industry for wood and hollow wall structures (wood screws, coach bolts, self-tappers, self drilling, metal thread, hollow wall anchors, behind plaster brackets, stud brackets, plasterboard devices, toggle devices)
- types of tools used for hollow wall fixing and supporting, using various fixing methods to fix/support to hollow walls.
- Using various fixing methods to fix/support to hollow walls.

Materials
- 1 x 300 x 400 plaster board sheet
- 2 x 300mm 50mm x 75mm timber stud
- 1 x off quick fix batton holder
- 1 x Stud bracket
- 1 x C wall bracket
- 1 x Wallmate fastener
- 1 x Metal hollow wall anchor
- 1 x Plastic wing hollow wall anchor
- 1 x Toggle bolt
- 1 x saddle
- 2 x switch plate

Tools Required
- Tool board
- Plaster saw

Personal Protective Equipment (PPE) Required
- Fully enclosed leather top shoes must be worn
- Safety Glasses must be worn
- Hair Nets must be worn if required

Risk Assessment of workshop
- See attached risk assessment
ATTACH RISK ASSESSMENT

ATTACH SAFE OPERATING PROCEDURE (SOP)
INSTRUCTIONS

READ ALL STEPS FIRST AND MAKE SURE THAT YOU HAVE AN UNDERSTANDING OF THE TASK TO BE COMPLETED

Step 1. Collect the material and your tool board from the tool store.

Step 2. Inspect and prepare the material by:
- Using a rule check the overall size.
- Mark and cut the material to size.
- Fix your plasterboard to the 2 timber studs (1 each side of the plaster)

Step 3. Mark out to the dimensions shown below for the fixing of devices. Note the following points:
- Using the pencil, square and a rule proceed with the following steps.
- Use a rule and square to place the items in the correct positions starting at the vertical reference edge.

Legend

A - quick fix batton holder
B - Stud bracket
C - C wall bracket
D - Wallmate fastener
E - Metal hollow wall anchor
F - Plastic wing hollow wall anchor
G - Toggle bolt
STOP HAVE YOUR TEACHER INSPECT YOUR WORK

Step 4. Once the teacher has inspected your work mount the equipment the plasterboard as per the LEGEND using the correct tools for the mounting process.

Step 5. Take your finished work to the class teacher for marking as the marking table below:

If you are unsure talk to your teacher.

<table>
<thead>
<tr>
<th>Marking scale</th>
<th>Mark</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall dimensions</td>
<td>/4</td>
<td>± 5mm</td>
</tr>
<tr>
<td>Correct items</td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td>Items in correct locations</td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td>Items mounted correct</td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td>Overall finish</td>
<td>/4</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>/20</td>
<td></td>
</tr>
</tbody>
</table>

– REMEMBER –
– WORK SAFELY AT ALL TIMES –
Observe correct isolation procedures
You may need to refer to Electrotechnology Practice by Jeffery Hampson to complete these questions:

1. Draw a stud wall and include top plate, nogging, stud, brace, bottom plate and plasterboard? (page 59)

2. Which is the stringest of the plaster board anchors?

3. What type of threaded fastener would I use for plaster board?

4. What two devices can we use to mount a switch plate to plaster board? (refer section 1 practical)
Solid fixing and support

TO ACHIEVE THE PURPOSE OF THIS SECTION:
At the end of this section the student will be able to:

- types and safe application of devices used for solid wall fixing and support
- methods/techniques used in to fix to masonry and concrete structures
- fixing devices used in the electrotechnology industry for solid wall structures (wall-plugs, expanding concrete fixing devices, gas powered fixing tools, powder actuated fixing tools, loxins, dynabolts, chemical devices)
- Regulatory requirements for use of powder fixing tools.
- hand and power tools used in fixing and supporting accessories
- using various fixing methods to fix/support to solid walls
Fixing into solid brick, block or concrete

When you need a fixing into masonry such as brick, block or concrete, you need to be confident that it will be strong enough for the application - the easiest way to be confident is to use the correct type of insert with the correct size of drill and screw. Although often referred to as wall fixings, the following devices are equally suitable for fixing into floors or masonry ceilings. Almost all types use expansion of the body to lock into the hole or to prevent pulling back through the mounting material.

Plugs

All the plastic or fibre plugs described below are designed for use with ordinary wood screws. Each basic type of plug is available in a range of sizes to suit specific screw diameters and often for specific length of screw. To ensure maximum strength when using a particular type and size of plug, always follow the manufacturer’s recommendations regarding the drill size and the length/size of screw. Generally it does not matter what material the screw is made from or the type of screw head, but when selecting the type of screw to use, think about the position and environment in which it will be used. If the screw head will be exposed, consider a brass or chrome finish, if the screw will be used in a damp area, avoid steel or other materials which will corrode.

Drilling masonry

All the plugs detailed require a hole to be drilled in the brick, block or concrete before the plug can be used. Often on internal walls, the material will be covered with a relatively thin coating of render and/or plaster.

Before drilling into any surface, check for concealed electric wiring and pipes.

Tungsten-carbide masonry drill bits should be used, driven by a hammer action power drill. The effort required to drill the hole depends a lot upon the material being drilled.

Drill the hole. Use a blower or compressed air to remove dust.

When drilling masonry always wear appropriate personal protective equipment.
Safety glasses/shield, earmuffs, respirator

Brick

Brick is basically baked clay, and a good quality brick will be free of both internal voids and internal pieces of 'non-clay' material. While the hardness of bricks will vary, they can normally be drilled accurately and cleanly.

Block

Block materials can vary considerably. Lightweight blocks can be drilled very easily but a risk with these blocks is that they are not very ‘forgiving’; a small amount of pressure in the wrong direction and the drill bit will “wander” away from the intended path.

On the other hand concrete blocks can vary greatly in hardness and the cleanliness of the final hole. Concrete hardness can vary between different areas of the same material. The hole tends not to be as clean as in brick and there is always a danger that the drill bit will hit a piece of harder material again causing the bit to wander. A hammer action power drill is generally required.

Concrete

Cast concrete is different from the block version in that the material is less 'grainy' with the particles more firmly bonded together. When drilling into cast concrete, pieces of hard aggregate of various sizes may be encountered, causing the drill bit to wander, prevent drilling to the correct depth or producing a ragged hole.

Sandstone

Materials such as sandstone and other natural masonry materials can be very brittle and will rupture if correct fastening procedures are not used. Some anchoring devices will not hold successfully in these materials.

Masonry anchors

Most plugs and anchors need to be a push fit into the drilled hole. If the hole is undersize, hammering the plug into the hole may damage the plug and/or make it impossible to drive the screw home in the correct manner. Too large a hole may make it difficult to drive the screw home (the plug may turn in the hole as the screw is turned) or provide reduced strength when the screw has been tightened.

Plastic plugs

These are available in a variety of lengths and for a variety of screw sizes. The interior of the plugs will usually be designed so that when a screw is fully inserted the end of the plug furthest from the surface expands the greatest.
Different diameters are available for different screw sizes - the different diameters are normally made with differing material colours for easy identification.

This type of plug is also available in continuous lengths of uniform cross section along the whole length. It is only necessary to cut off the appropriate length after the hole has been drilled and insert into the hole as normal. Although convenient, this material does not give as firm a fixing as the plugs because of its uniform cross-section.

<table>
<thead>
<tr>
<th>Plastic anchor colour codes</th>
<th>Drill size</th>
<th>Screw size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Colour</td>
<td>mm</td>
</tr>
<tr>
<td>White 25mm long plug</td>
<td>White</td>
<td>5</td>
</tr>
<tr>
<td>Red 25mm long plug</td>
<td>Red</td>
<td>6</td>
</tr>
<tr>
<td>Green 25mm long plug</td>
<td>Green</td>
<td>7</td>
</tr>
<tr>
<td>Blue 25mm long plug</td>
<td>Blue</td>
<td>8</td>
</tr>
<tr>
<td>Orange 38mm long plug</td>
<td>Orange</td>
<td>10</td>
</tr>
</tbody>
</table>

Drill the hole to the same depth as the wall plug. Push the plug into the hole, insert the screw through the work piece into the plug and tighten.

**Fibre plugs**

Fibre plugs are often thought of as old-fashioned however they still have a use today. One of their advantages over plastic is that screw can be removed/replaced a number of times without having to replace the plug. They also tend to stand up to high temperatures better than plastic.

**Ribbed barrel plugs**

Ribbed barrel give a really tight fit. Each plug will take a range of screw sizes and a choice of lengths is available.

**Soft materials such as lightweight block**

Because lightweight block is a very soft substance, special plugs are required. These plugs tend to be like ordinary wall plugs but with helical wings around the barrel. The helical wings grip the sides of hole. As the screw is tightened, the wings cut further into the block giving a very strong fixing.

Drill the whole the same diameter as the plug barrel. The overall diameter of the plug will be about twice the diameter of the barrel, and the plug will need to be hammered into the wall so that the wings cut into the sides of the hole. Slip the screw through the work piece into the plug and tighten.
**Metal pin anchors**

All that is required for the installation of these anchors is to drill the hole to the correct dimensions, insert the anchor over the part to be fixed and hammer home the nail. The body expands into the hole and is very difficult to remove.

**Nut or bolt metal inserts**

These can offer stronger and more temperature resistant fixings than plastic or fibre plugs.

The anchoring part of the insert comprises one or a number of metal sleeves, which are forced into the side of the hole by a cone, which is pulled forward into the segments by the nut or bolt being tightened. Tightening pulls the cone into the segments but it can also tend to force the insert out of the wall if the hole is too large or it is not held in position until the sleeve begin to bite into the side of the hole.

The projecting type has an external screw thread, which extends from the insert to allow for different work piece thicknesses of. The hole in the surface only needs to be as deep as the actual insert itself.

Bolt type inserts incorporate a thread in the cone and a bolt is inserted from the through the part to be fixed and into the anchor. The hole in the surface needs to be deep enough to ensure that the bolt does not bottom when it is fully tightened.

Installation is similar to the projection type.
Chemical anchors

A chemical anchor is a threaded rod that is set in liquid epoxy or acrylic resin and activator. The liquid chemicals become hard when mixed to provide the locking mechanism between the threads on the rod and the rough internal sides of the hole in the masonry. They are used in brittle materials such as sandstone which will burst if expanding anchors are used.

Powder actuated fasteners

Powder actuated fastening systems use an explosive power tool to force all types of fasteners into steel, concrete, brick and rock to fasten equipment and machinery such as conduit, switchboards and small electric motors. Although this fastening system is simple to use, there are precautions that must be observed. All workers that may operate powder actuated tools must be trained in the operation of that particular tool. The fasteners used in powder actuated tools are manufactured from special steel and heat treated to produce a very hard, ductile fastener. The more commonly used fasteners are drive pins and threaded studs.

Expanding gas operated setting tool

Gas technology uses an expanding gas operated electronic controlled setting tool for driving fastening elements such as hardened pins into wood, steel and concrete. No special training is required to use this tool. This tool can fix cable and with the use of an adaptor, conduit saddles.

***************
Practical exercise Solid wall fixing

Skills & Knowledge

**Group T2**

- types and safe application of devices used for solid wall fixing and support
- methods/techniques used in to fix to masonry and concrete structures
- fixing devices used in the electrotechnology industry for solid wall structures (wall-plugs, expanding concrete fixing devices, loxins, and dyna-bolts)
- hand and power tools used in fixing and supporting accessories
- using various fixing methods to fix/support to solid walls

Materials

- Concrete besser block
- Solid brick
- Green raw plugs
- 6mm dyna-bolt

Tools Required

- Power drill
- Ring and open end spanners

Personal Protective Equipment (PPE) Required

- Hearing protection
- Safety eyewear
- Solid closed in boots

Risk Assessment of workshop
ATTACH RISK ASSESSMENT

ATTACH SAFE OPERATING PROCEDURE (SOP)
INSTRUCTIONS

YOUR TEACHER WILL INSTRUCT YOU ON SOLID WALL FIXING PRACTICAL

If you are unsure talk to your teacher.

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– REMEMBER –
– WORK SAFELY AT ALL TIMES –
Observe correct isolation procedures
Metal Fixings

TO ACHIEVE THE PURPOSE OF THIS SECTION:
At the end of this section the student will be able to:

- accessories that may be fixed to metal (saddle clips, conduits, brackets, switches)
- techniques for fixing to metal
- fixing devices: coach bolts, self-tappers, metal thread bolts, hollow wall anchors, rivets
- fixing tools - spanners, screwdrivers, power screw drivers, pop riveters, files, reamers
- OH&S issues related to drilling, cutting, eye protection, metal filings, swarf, noise
- Using power drills, drill bits, change drill speeds.
- Install a fixing device and accessory capable of supporting up to 20 kg on the metal plate.
In the electrical trades you may be required to mount or secure items to a metal surface. The following sections will help you choose the correct tools and/or method to use as to complete the job in a safe and tradesman-like manner.

**Accessories**

Accessories at times will need to be secured to a metal surface. Some of these are conduit saddles, conduit mounting boxes for lights and sockets, cable tray, and support brackets which will need to hold weight.

Saddles come in many different sizes and in half or full saddle.

Cable tray is an important part of our work and can support some heavy weights due to the amount of cable which it may carry.

The type of mounting device you select depends on the weight it may have to carry safely.
Techniques and devices for fixing to metal

Once the load and accessories has been chosen the method of how to fasten to the surface will depend on the weight.

For light weight devices on thin metal surface up to 2mm a self-tapping screw can be used, these require a pilot hole so that the screw can penetrate the material and cut their own thread into the material.

Once the weight starts to increase and the material thickness start to get larger, coach bolts should be used to hold larger loads to the surface. These come in different sizes and lengths to suit most mounting brackets and devices. They require the drilling of a clearance hole through both device and material so that the bolt can inserted through and tightened.
Hand tools used in fixings

Most electricians will carry a selection of hand tools these are only some of them

Screwdrivers

Open ended spanner

Ring spanner

Adjustable spanner

Pop rivet gun
WH&S related issues with fixings

When working around power drills hammer drills and cutting tools there is some safety precautions that must be observed before you start.

Eye protection is one of the most important forms of PPE and is one of the simplest to use, eye protection can be safety glasses goggles or even a face shield as per the picture. Eye protection must be worn at all times when signs are displayed, or when using drills and grinders.

Hearing protection may also be required when working on site or with drills and grinders as loud noises will affect your hearing and may even damage it resulting in hearing loss. Protection can be through the use of ear muffs or through the selection of different ear plugs.
Power tools used in fixings

Before you use any power tool you are required to check that the tool has been tested and are in date for safe use, also a quick inspection that the lead is in good condition and that the tool is not damaged.

Power tools that are most commonly used in the fixing of devices in the electrical industry are the power drill, cordless drill and pedestal drill.

The hand held power drill has an adjustable speed through the trigger with forward and reverse switch as well as a hammer feature. These drills have up to 12mm chuck.

The cordless drill normally has a variable speed trigger with a forward and reverse feature, the later models have hammer as well. These drills normally take up to 10mm chuck.
Pedestal drills are used to drill more accurate hole and the material is clamped to the drill for support, this drill has selectable speeds however the top cover of this drill needs to be opened and the drive belts changed to the speed setting required.

All these drills have waste material called swarf. This is the metal which has been removed from the hole, it is sharp and if it is steel it will rust quickly and affect the painted surface if not cleaned up. Good housekeeping should be practice and this waste removed safety removed and recycled or placed into the correct waste bin.
Fixing devices for 20kg or greater

It is important that the correct mounting device be selected for the load it is carry such as a TV mount, your customer spends a lot of money on a TV so the mount you select is important as not to let the TV smash to the floor or even injure someone that it fall onto. This also goes for larger item such as supports for metal brackets which might fix to a wall.

A question that you may ask yourself is the bracket rated for the load and is the surface to which I am about to fix the bracket to strong enough to hold the weight of the total job?
Metal Fixing

**Skills & Knowledge**

Group T1

- accessories that may be fixed to metal (saddle clips, conduits, brackets, switches)
- techniques for fixing to metal
- fixing devices: coach bolts, self-tappers, metal thread bolts, hollow wall anchors, rivets
- fixing tools - spanners, screwdrivers, power screw drivers, pop riveters, files, reamers
- OH&S issues related to drilling, cutting, eye protection, metal filings, swarf, noise
- Using power drills, drill bits, change drill speeds.
- Install a fixing device and accessory capable of supporting up to 20 kg on the metal plate.

**Materials**

- 2 x 100mm x 100mm x 1.2mm
- 2 x pop rivets
- 2 x ¼ nut & bolt
- 1 x full saddle

**Tools Required**

- Cordless drill
- Pedestal drill

**Personal Protective Equipment (PPE) Required**

- Fully enclosed leather top shoes must be worn
- Safety Glasses must be worn
- Hair Nets must be worn if required

**Risk Assessment of workshop**

- See attached risk assessment
ATTACH RISK ASSESSMENT

ATTACH SAFE OPERATING PROCEDURE (SOP)
INSTRUCTIONS

READ ALL STEPS FIRST AND MAKE SURE THAT YOU HAVE AN UNDERSTANDING OF THE TASK TO BE COMPLETED

Step 1. Collect the material and your tool board from the tool store.

Step 2. Inspect and prepare the material by:

- Using a rule check the overall size.
- Using the picture below mark out the location for the fixing hole to be drilled in one piece

![Diagram of saddle mounting holes (nut & bolt), fold line, and fixing holes (pop rivets)]

Step 3. Mark out the fold line on both pieces

Step 4. Using the saddle mark out the holes to be drilled for the 2 nut & bolts in one piece

Teacher to check your work

Step 5. Once the teacher has inspected your place the two pieces in the folder and fold to about 90° and remove from folder.
Step 6. Place the two pieces one on top of the other and clamp into the pedestal drill and proceed to drill the two holes for the pop rivets

Step 7. Return to your bench and using the vice clamp the piece with the markings for the saddle and drill with a cordless drill

Step 8. Using a pop rivet gun join the two pieces through the fixing holes with pop rivets

Step 9. Mount the saddle with the 2 nut and bolts

Make sure that your task is correct and then present to your teacher for marking

If you are unsure talk to your teacher.

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– REMEMBER –
– WORK SAFELY AT ALL TIMES –
Observe correct isolation procedures
Please refer to Electrotechnology Practice by Jeffery Hampson Page 63 and complete questions 49, 51, 53, 54, 57.
Adhesives and Tapes

TO ACHIEVE THE PURPOSE OF THIS SECTION:
At the end of this section the student will be able to:

- types and safe application of using adhesives and tapes as fixing devices (load limits of different commercial products)

- accessories that may be fixed using adhesives and tapes

- techniques for the application of adhesives and tapes

- tools used to apply and cut adhesives and tapes

- hazards and safety measures when working with adhesives and chemical fixing devices (fumes, cutting, eye protection, physical contact, hand protection,
Other means of fixing include tapes and adhesives, while tapes are common in the home, when fixing large heavy items to a surface they prove to be less than adequate and tapes will often give way under stress and the item will separate from the surface and may damage the item or even injure someone.

However some items that electricians use may be fixed with tape such as;

Labels and name plates to switchboards and fittings, other items which can be secured to a surface may include PVC duct with double sided tape on the rear side, where this is used the duct should be small in size and only have one or two cables inside as the weight of these cables over time may cause the tape to give way and the duct to part from the surface.

**Types of adhesives and tape used**

**Double sided tape**

Used for light weight fixings as heat and weight over a prolonged time will cause the tape to let go from surface.

**Hook and loop style**

Used to secure cables positions were they need to be relocated often and quickly an example for this would be a patch lead in a communication panel.
Glue and solvents

Most common in the electrical industry is glues and solvents such as PVC conduit cement which is used to join conduits together and prevent them from separating, this prevents the ingress of unwanted items such as water and dirt’s which may damage cables and to maintain the integrity of the electrical system (insulation and protection from mechanical damage).

Accessories which can be fixed using adhesives and tapes

Double sided tapes should be used only on items which are light weight such as labels, small PVC duct and self-adhesive cable tie mounts.
As well as securing items to a surface as electricians you will be required to protect the cables which you have installed this is done with the use of PVC or steel conduit, for this section we will look only at PVC.

At time when PVC conduit is installed it is a requirement that all joints be secured as not to separate and expose cables, so PVC cement is used on the joints to fix them together.

PVC cement is a solvent which has a chemical effect on the PVC and when contact is made with another PVC surface and the air is removed a bond is made that is a chemical mix between the two surfaces.

**Techniques**

Before any tape can be used the surface must be prepared correctly, for best results the surface must be free from lose paint, rust scale or any loose material as this will only stick to the tape and the tape will not make contact with the surface that you are trying to stick it to. As well as lose material any oils or residue left on the surface will cause the tape surface not to make contact with the item or mount.

**IF TAPE IS TO BE USED A CLEAN SURFACE IS REQUIRED ON BOTH THE SURFACE AND THE ITEM TO BE MOUNTED.**
When PVC conduit is to be joined we need to use something a little stronger solvent cement. This is a solvent which uses the exposure to air to dry giving of a smell which in turn means potential hazards, only conduct this in a well-ventilated room or outside.

Once you have you conduit cut to size and ready to install the solvent cement must be applied to one surface and be completely around the circumference of the conduit. The two pieces of conduit are pushed together and held in position until the conduit is dry. This only take a few seconds to complete so care must be taken to achieve this quickly as the cement will set.
Hazards and safety measures

As with all chemicals used in today we must take certain measures to protect ourselves and the environment and keep chemicals out of harm’s way both in the direct future and the distant future. Some chemicals seem OK to use now but in the future that chemical may be linked to cancer or other illness. That is why PERSONAL PROTECTIVE EQUIPMENT (PPE) is one of the most important items in your tool kit.

Chemicals can enter the body in different ways

Inhalation:
When chemicals are exposed to air, fumes leave the chemical and mix with the air and can enter the body through the lungs and then direct into the blood stream.

Ingestion:
The way in which you can ingest a chemical include, place the chemical in your mouth, getting splashed or the chemical has come in contact with your hands and you place your hand in your mouth or handle food.

Absorption / Skin cuts:
Absorption through the skin is due to contact, if the skin is broken due to cuts it gives the chemical a direct path to the blood supply

SOME BASIC PPE WHICH WILL HELP PERVENT YOU COMING IN CONTACT
Before you handle adhesives it is recommended that you obtain the Material safety Data Sheet (MSDS) from the supplier which has information about the storage, use and how to treat if poisoning acours.

Below is an example of a MSDS for the following:

**CANTEX GHS SAFETY DATA SHEET**

Date Revised: APR 2010
Supersedes: SEP 2009

**SECTION 1 - PRODUCT AND COMPANY**

**IDENTIFICATION**

CANTEX #99 GRY Low VOC PVC Plastic Pipe Cement
Low VOC Solvent Cement for PVC Plastic Pipe

**MANUFACTURER:** IPS Corporation
17109 South Main Street, Carson, CA 90248-3127
P.O. Box 379, Gardena, CA 90247-0379
Tel. 1-310-898-3300
EMERGENCY: Transportation: Tel. 800.424.9300, 703.527.3887
CHEMTREC (International) Medical: Tel. 800.451.8348, 760.602.8703 3E
Company (International)

**SECTION 2 - HAZARDS IDENTIFICATION**

Acute Toxicity: Category 4 Acute Toxicity: None Known Flammable Liquid
Category 2
Skin Irritation: Category 3 Chronic Toxicity: None Known
Skin Sensitization: NO
Eye:
GHS LABEL: Signal Word: WHMIS CLASSIFICATION: CLASS B, DIVISION 2
OR Danger
H225: Highly flammable liquid and vapor P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
H319: Causes serious eye irritation P261: Avoid breathing dust/fume/gas/mist/vapors/spray
H332: Harmful if ingested P381: Keep patient comfortable and quiet. If nausea, vomiting, or diarrhea occurs, seek medical advice immediately.
H355: May cause respiratory irritation P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
H336: May cause drowsiness or dizziness P403+P233: Store in a well ventilated place. Keep container tightly closed
EUH019: May form explosive peroxides P501: Dispose of contents/container in accordance with local regulation

**SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENTS**

**CAS ENEC# # CONCENTRATION**

Pre-registration Number % by Weight
Tetrahydrofuran (THF) 109-99-9 203-726-8 05-2116297729-22-0000 10 - 30
Methyl Ethyl Ketone (MEK) 78-93-3 201-159-0 05-2116297728-24-0000 20 - 40
Acetone 67-64-1 200-662-2 05-2116297718-25-0000 5 - 15
Cyclohexanone 108-94-1 203-631-1 05-2116297720-23-0000 15 - 35

All of the constituents of this adhesive product are listed on the TSCA inventory of chemical substances maintained by the US EPA, or are exempt from that listing.

* Indicates this chemical is subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (40CFR372).

**SECTION 4 - FIRST AID MEASURES**

Contact with eyes: Flush eyes immediately with plenty of water for 15 minutes and seek medical advice immediately.
Skin contact: Remove contaminated clothing and shoes. Wash skin thoroughly with soap and water. If irritation develops, seek medical advice.
Inhalation: Remove to fresh air. If breathing is stopped, give artificial respiration. If breathing is difficult, give oxygen. Seek medical advice.
Ingestion: Rinse mouth with water. Give 1 or 2 glasses of water or milk to dilute. Do not induce vomiting. Seek medical advice immediately.

**SECTION 5 - FIREFIGHTING MEASURES**

Suitable Extinguishing Media: Dry chemical powder, carbon dioxide gas, foam, Halon, water fog. HMIS NFPA 0-Minimal
Unsuitable Extinguishing Media: Water spray or stream. Health 2 2 1-Slight

**SECTION 6 - ACCIDENTAL RELEASE MEASURES**

Personal precautions: Keep away from heat, sparks and open flame.
Provide sufficient ventilation, use explosion-proof exhaust ventilation equipment or wear suitable respiratory protective equipment.
Prevent contact with skin or eyes (see section 8).

Environmental Precautions: Prevent product or liquids contaminated with product from entering sewers, drains, soil or open water course.
Methods for Cleaning up: Clean up with sand or other inerts absorbent material. Transfer to a closable steel vessel.

**SECTION 7 - HANDLING AND STORAGE**

Handling: Avoid breathing of vapor, avoid contact with eyes, skin and clothing.
Keep away from ignition sources, use only electrically grounded handling equipment and ensure adequate ventilation/fume exhaust hoods. Do not eat, drink or smoke while handling.

Storage: Store in ventilated room or shade below 44°C (110°F) and away from direct sunlight.
Keep away from ignition sources and incompatible materials: caustics, ammonia, inorganic acids, chlorinated compounds, strong oxidizers and isocyanates.
Follow all precautionary information on container label, product bulletins and solvent cementing literature.
SECTION 8 - PRECAUTIONS TO CONTROL EXPOSURE / PERSONAL PROTECTION

EXPOSURE LIMITS: ACGIH TLV ACGIH STEL OSHA PEL OSHA STEL:

- Tetrahydrofuran (THF) 50 ppm 100 ppm 200 ppm
- Methyl Ethyl Ketone (MEK) 200 ppm 300 ppm 200 ppm
- 20 ppm 50 ppm 50 ppm
- Acetone 500 ppm 750 ppm 1000 ppm

Engineering Controls: Use local exhaust as needed.

Monitoring: Maintain breathing zone airborne concentrations below exposure limits.

Personal Protective Equipment (PPE):

- Eye Protection: Avoid contact with eyes, wear splash-proof chemical goggles, face shield, safety glasses (spectacles) with brow guards and side shields, etc. as may be appropriate for the exposure.
- Skin Protection: Prevent contact with the skin as much as possible. Butyl rubber gloves should be used for frequent immersion.
- Use of solvent-resistant gloves or solvent-resistant barrier cream should provide adequate protection when normal adhesive application practices and procedures are used for making structural bonds.
- Respiratory Protection: Prevent inhalation of the solvents. Use in a well-ventilated room. Open doors and/or windows to ensure airflow and air changes. Use local exhaust ventilation to remove airborne contaminants from employee breathing zone and to keep contaminants below levels listed above.

With normal use, the Exposure Limit Value will not usually be reached. When limits approached, use respiratory protection equipment.

Cyclohexanone

Precautionary Statements

Component

Environmental

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear or gray, medium syrupy liquid

Odor: Ketone Odor Threshold: 0.88 ppm (Cyclohexanone)

pH: Not Applicable

Melting/Freezing Point: -108.5°C (-163.3°F) Based on first melting component: THF Boiling Range: 66°C (129°F) to 136°C (274°F)

Boiling Point: 56°C (133°F) Based on first boiling component: Acetone Evaporation Rate: > 1.0 (BUAC = 1)

Flash Point: 20°C (+4°F) TCC based on Acetone Flammability: Category 2

Specific Gravity: 0.920 @23°C (73°F) Flammability Limits: LEL: 1.1% based on Cyclohexanone

Solubility: Solvent portion soluble in water. Resin portion separates out. UEL: 12.8% based on Acetone

Partition Coefficient n-octanol/water: Not Available Vapor Pressure: 190 mm Hg @ 20°C (68°F) Acetone

Auto-ignition Temperature: 321°C (610°F) based on THF Vapor Density: >2.0 (Air = 1)

Decomposition Temperature: Not Applicable Other Data: Viscosity: Medium bodied

VOC Content: When applied as directed, per SCAQMD Rule 116B, Test Method 316A VOC content is: < 510 g/l.

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Hazardous decomposition products: None in normal use. When forced to burn, this product gives off oxides of carbon, hydrogen chloride and smoke.

Conditions to avoid: Keep away from heat, sparks, open flame and other ignition sources.

Incompatible Materials: Oxidizers, strong acids and bases, amines, ammonia

SECTION 11 - TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, Eye and Skin Contact

Acute symptoms and effects:

- Inhalation: Severe overexposure may result in nausea, dizziness, headache. Can cause drowsiness, irritation of eyes and nasal passages.
- Eye Contact: Vapors slightly uncomfortable. Overexposure may result in severe eye injury with corneal or conjunctival inflammation on contact with the liquid.
- Skin Contact: Liquid contact may remove natural skin oils resulting in skin irritation. Dermatitis may occur with prolonged contact.
- Ingestion: May cause nausea, vomiting, diarhoea and mental sluggishness.
- Chronic (long-term) effects: None known to humans

Toxicity: LD50 LC50

Tetrahydrofuran (THF) Oral: 2842 mg/kg (rat) Inhalation 3 hrs. 21,000 mg/m³ (rat)

Methyl Ethyl Ketone (MEK) Oral: 2757 mg/kg (rat) Dermal: 6480 mg/kg (rabbit) Inhalation 8 hrs. 23,500 mg/m³ (rat)

Cyclohexanone Oral: 1355 mg/kg (rat) Dermal: 948 mg/kg (rabbit) Inhalation 4 hrs. 8,000 PPM (rat)

Acetone Oral: 5800 mg/kg (rat) Inhalation 50,100 mg/m³ (rat)

SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity: None Known

Mobility: In normal use, emission of volatile organic compounds (VOC’s) to the air takes place, typically at a rate of < 510 g/l.

Degradability: Biodegradable

Bioaccumulation: Minimal to none.

SECTION 13 - WASTE DISPOSAL CONSIDERATIONS

Follow local and national regulations. Consult disposal expert.

SECTION 14 - TRANSPORT INFORMATION

Proper Shipping Name: Adhesives

Hazard Class: 3

Secondary Risk: None DOT Limited Quantity: Up to 5L per inner packaging, 30 kg gross weight per package.

Identification Number: UN 1133 Consumer Commodity: Depending on packaging, these quantities may qualify under DOT as "ORM-D".

Grouping: PG II

Label Required: Class 3 Flammable Liquid

Disclaimer: Printed copies of this document are regarded as uncontrolled.
Marine Pollutant: NO TDG CLASS: FLAMMABLE LIQUID 3
SHIPPING NAME: ADHESIVES
UN NUMBER/PACKING GROUP: UN 1133, PG II

SECTION 15 - REGULATORY INFORMATION
Precautionary Label Information: Highly Flammable, Irritant Ingredient Listings: USA TSCA, Europe EINECS, Canada DSL, Australia
Symbols: F, Xi AICS, Korea ECOLTCGL, Japan MITI (ENCS)
Risk Phrases: R11: Highly flammable. R66: Repeated exposure may cause skin dryness or cracking
R20-Harmful by inhalation. R67: Vapors may cause drowsiness and dizziness
R36/37: Irritating to eyes and respiratory system.
Safety Phrases: S9: Keep container in a well-ventilated place. S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S16: Keep away from sources of ignition. - No smoking. S33: Take precautionary measures against static discharges.
S25: Avoid contact with eyes. S46: If swallowed, seek medical advise immediately and show this container or label.

SECTION 16 - OTHER INFORMATION
Specification Information:
Department issuing data sheet: IPS, Safety Health & Environmental Affairs All ingredients are compliant with the requirements of the European
E-mail address: <EHSinfo@ipscorp.com> Directive on RoHS (Restriction of Hazardous Substances).
Training necessary: Yes, training in practices and procedures contained in product literature.
Reissue date / reason for reissue: 4/28/2010 / Updated GHS Standard Format
Intended Use of Product: Solvent Cement for PVC Plastic Pipe
This product is intended for use by skilled individuals at their own risk. The information contained herein is based on data considered accurate based on current state of knowledge and experience. However, no warranty is expressed or implied regarding the accuracy of this data or the results to be obtained from the use thereof.
EXCEPTION for Ground Shipping
TDG INFORMATION
Mutagenicity Embryotoxicity Sensitization to Product Synergistic Products
Not Established
Reproductive Effects
Not Established Not Established Not Established Not Established Not Established
Teratogenicity

Adhesives and tapes

Skills & Knowledge
Group T4

Materials

Tools Required

Personal Protective Equipment (PPE) Required

Risk Assessment of workshop

ATTACH RISK ASSESSMENT

ATTACH SAFE OPERATING PROCEDURE (SOP)
INSTRUCTIONS

READ ALL STEPS FIRST AND MAKE SURE THAT YOU HAVE AN UNDERSTANDING OF THE TASK TO BE COMPLETED

Make sure that your task is correct and then present to your teacher for marking

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