

PENGENALAN KEPADA PERKHIDMATAN MEKANIKAL



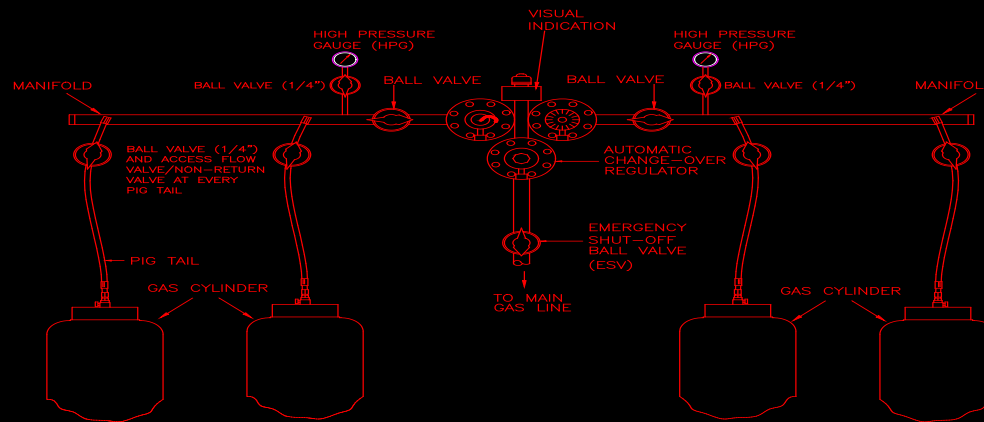
LIQUIFIED PETROLEUM GAS PIPE RETICULATION SYSTEM



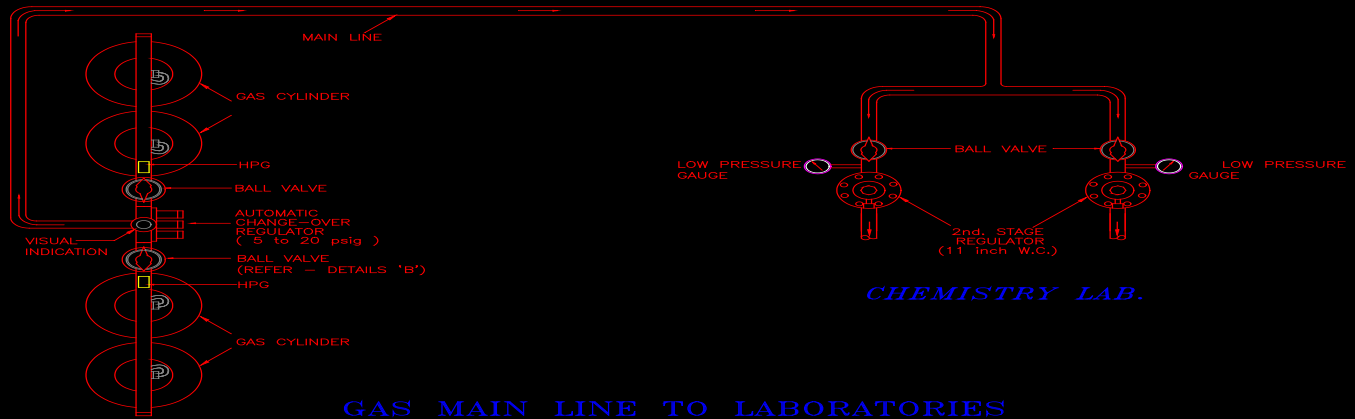
- AKTA BEKALAN GAS 1993 (AKTA 501)
- PERATURAN-PERATURAN BEKALAN GAS 1997
- MS 830 & MS 930

LPG SYSTEM

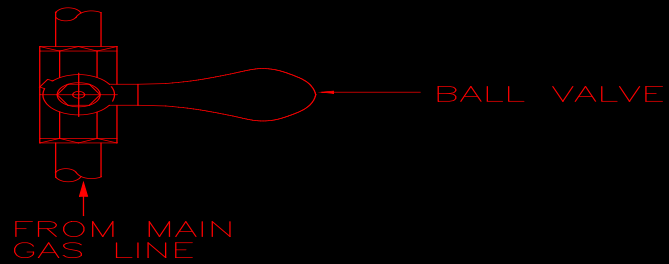
- Two banks of cylinders
- Cylinder manifold
- Pipeworks & fittings
- Valves & Gas tap
- Pressure Regulator
- Pressure gauge



MANIFOLD COMPLETE WITH
AUTOMATIC CHANGE-OVER REGULATOR



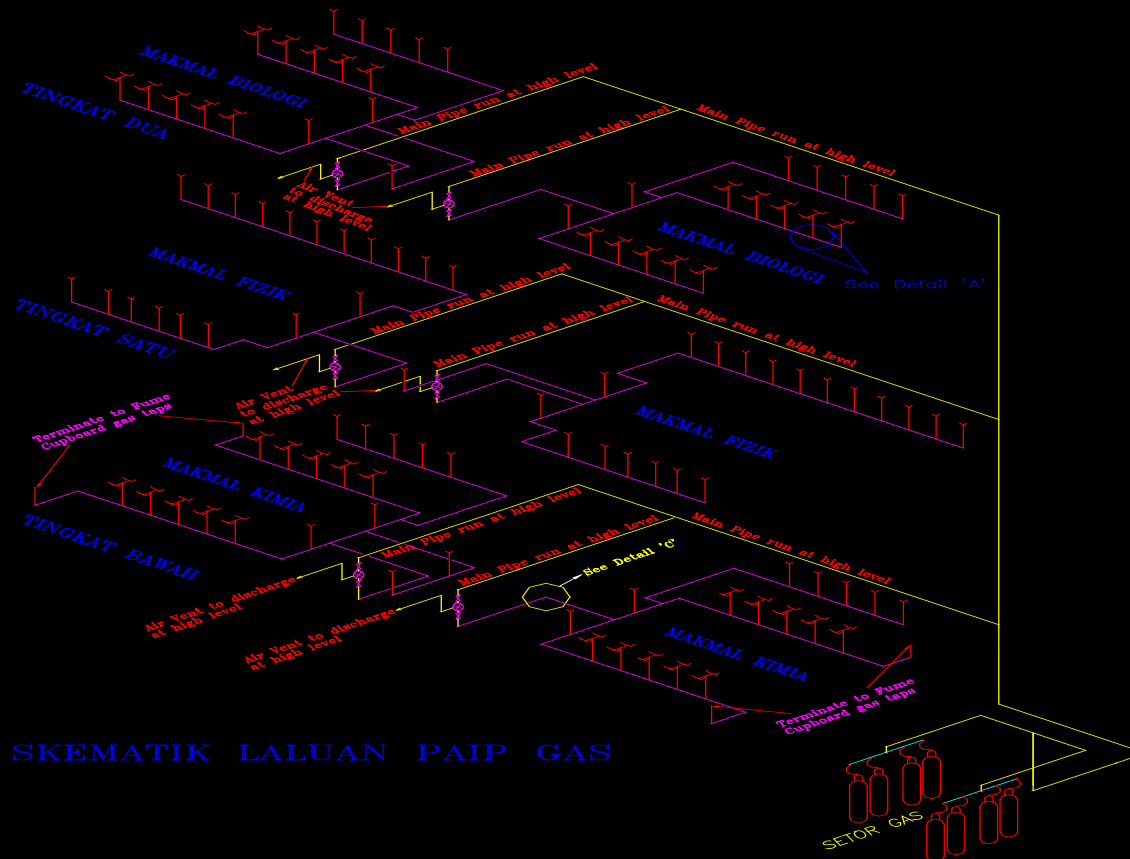
GAS MAIN LINE TO LABORATORIES



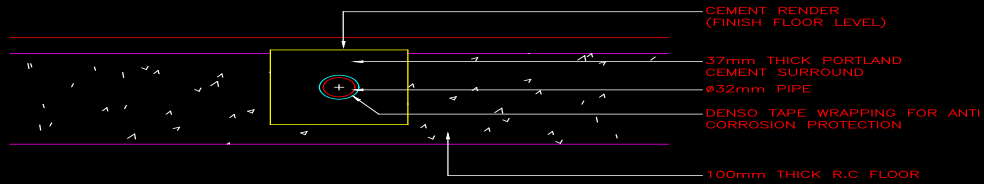
DETAILS 'B'

PIPEWORKS & FITTINGS

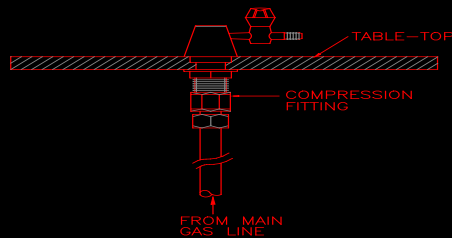
- Able to withstand test pressure of 35.5 p.s.i or 2.5 times the m.o.p.
- Supports interval in accordance to MS 930
- Type of pipe used (G.I class C, Sch. 40, grade B)



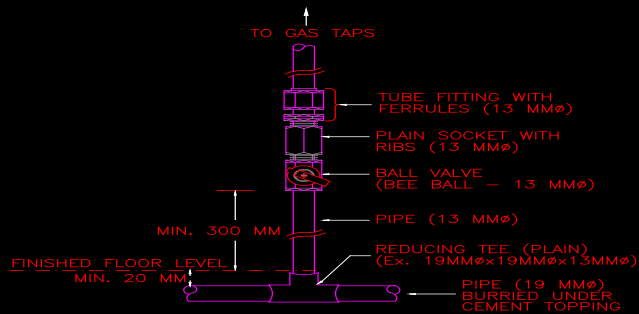
SKEMATIK LALUAN PAIP GAS



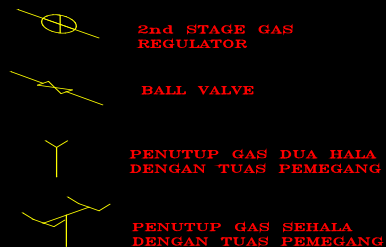
DETAIL 'C'
CROSS SECTION SHOWING INSTALLATION OF LPG PIPING IN FLOOR SLAB



GAS-TAP C/W FITTINGS



DETAIL 'A'
CONNECTION FROM DISTRIBUTION PIPINGS/TUBE TO BENCH GAS-TAPS



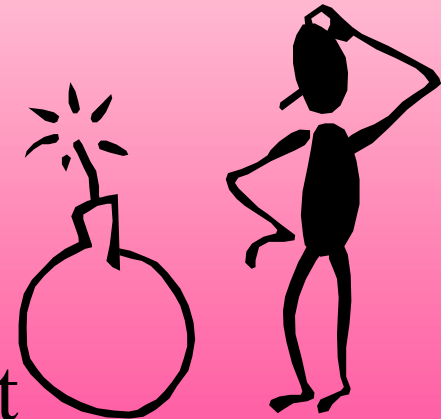
Responsibilities of the Contractor

- All items & materials approved by JBEG
- Obtain Approval To Install(ATI) letter
- Obtain Approval To Operate(ATO) letter



Akta Bekalan Gas 1993 & Peraturan-Peraturan Gas 1997

- Denda tidak melebihi RM100,000 atau penjara tidak melebihi 5 tahun atau kedua-kedua nya
- Pengubahsuaian, tambahan atau pemasangan kritikal, perlu mendapat kebenaran JBEG



PENGENALAN KEPADA
PERKHIDMATAN MEKANIKAL

KITCHEN EQUIPMENT



TYPICAL LAYOUT

- Receiving area
- Preparation area
- Cooking area
- Pantry area
- Serving area
- Washing area
- Dining area

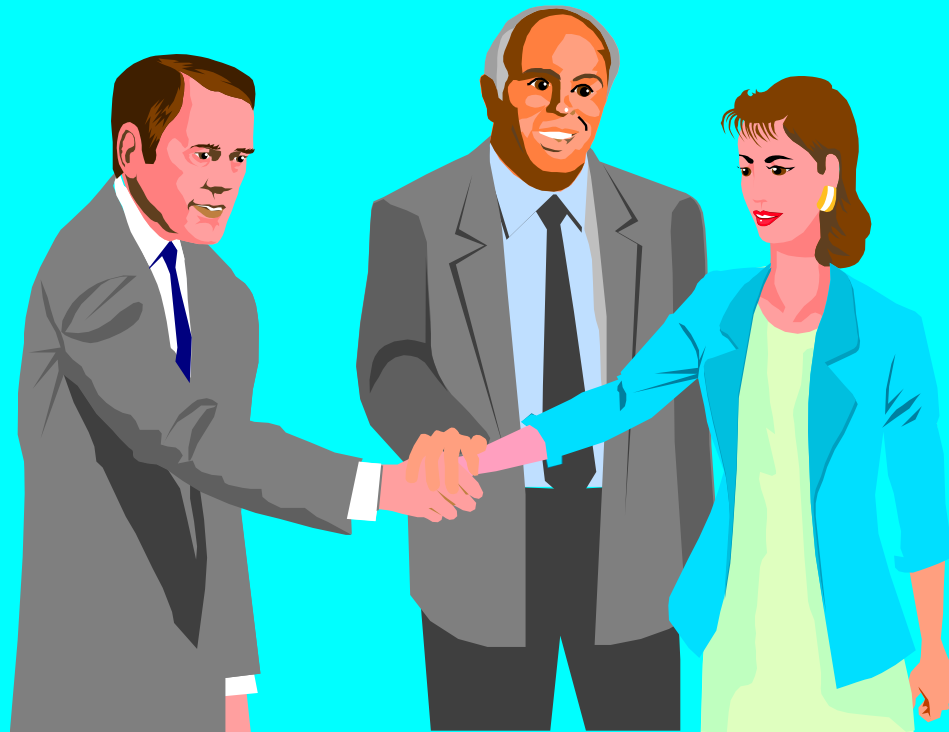
EQUIPMENT/MATERIAL SELECTION

- Material
- Size
- Capacity/quantity
- Finishes
- Testing & Commissioning
- Approval

VENTILATION- HOOD

- Cooking area
- Clearance between equipment and hood edge -2 ft
- Hood Construction of non combustible metal

TERIMA KASIH



**KURSUS UNTUK JURUTERA-
JURUTERA MEKANIKAL BARU
JKR MALAYSIA**



**LOW PRESSURE LIQUEFIED PETROLEUM GAS
INSTALLATION IN ACCORDANCE WITH GAS
SUPPLY ACT 1993 AND GAS SUPPLY
REGULATION 1997**



Gas Supply Act 1993 & Gas Supply Regulation 1997

- Enforced on 17 July 1998
- To take preventive measure to ensure safety of LPG system life cycle

Liquefied Petroleum Gas

- Mixture of light hydrocarbons , gaseous at normal temperature and pressure
- Main component gases of LPG
- Butane - 70% (30,200 Kcal/sm³)
- propane - 30% (22,968 Kcal/sm³)

PHYSICAL PROPERTIES

- Odourless
- Tasteless
- Colourless (completely clear)
- Non-toxic

PHYSICAL PROPERTIES

- Flammable Range (2-10%) in air
- Expands to 250x from liquid to gas
- Non-poisonous
- Heavier than air- 1.92 (S.G)
- Downhill, low spots

LPG Reticulation System

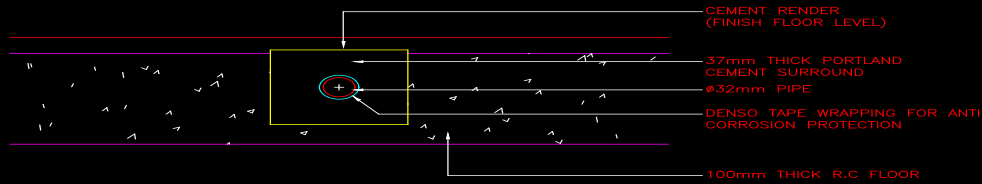
- Planning
- Design
- Construction
- Testing & Commissioning
- Maintenance

PLANNING

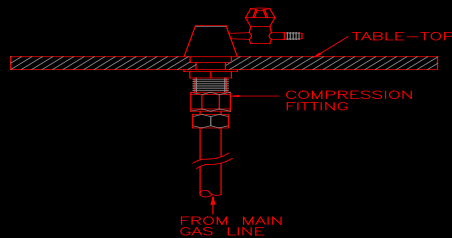
- Selection of pipelines- route
- Gas pipe shall not run in rooms containing electrical equipment or in fire protected areas
- Strategically located- ease of maintenance
- Shut-Off valves must be accessible



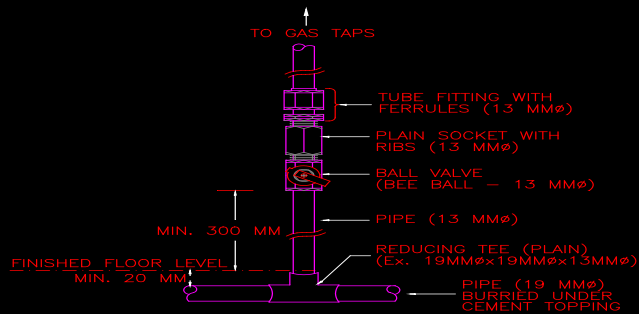




DETAIL 'C'
CROSS SECTION SHOWING INSTALLATION OF LPG PIPING IN FLOOR SLAB



GAS-TAP C/W FITTINGS



DETAIL 'A'
CONNECTION FROM DISTRIBUTION PIPINGS/TUBE TO BENCH GAS-TAPS



2nd STAGE GAS REGULATOR



BALL VALVE



PENUTUP GAS DUA HALA DENGAN TUAS PEMEGANG



PENUTUP GAS SEHALA DENGAN TUAS PEMEGANG

Design

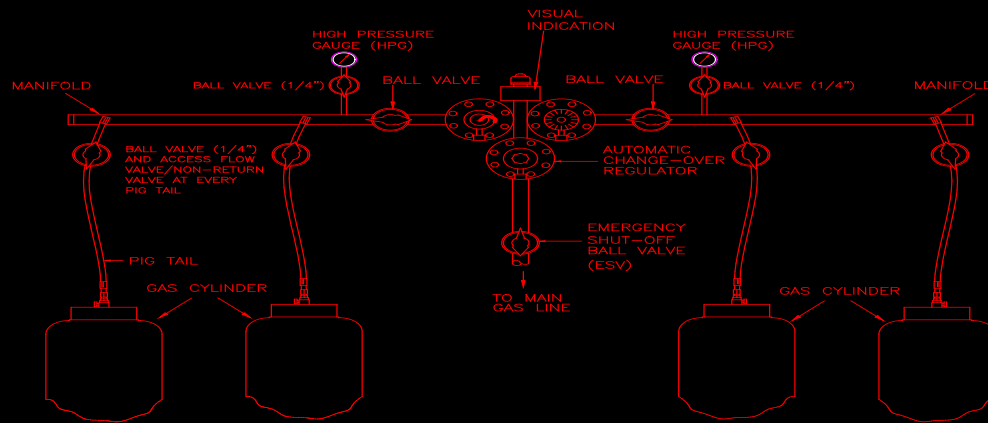
- LPG Cylinders
- Piping and Fitting
- Pressure Gauge and Regulator

- **RULES & CODES**

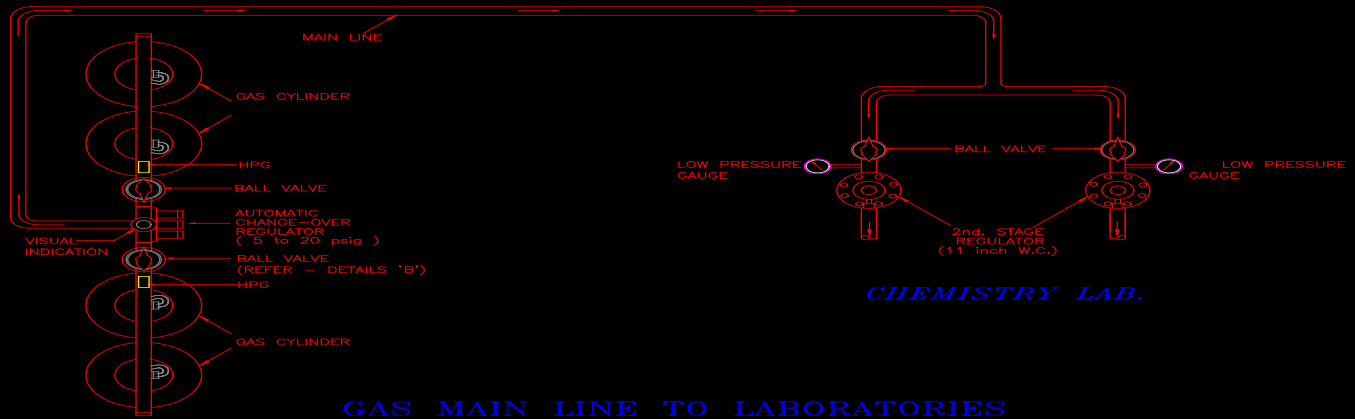
- BS 6400 & 6891
- AKTA BEKALAN GAS 1993 (AKTA 501)
- PERATURAN-PERATURAN BEKALAN GAS 1997
- MS 830 & MS 930
- National Fuel Gas Code Handbook

LPG SYSTEM

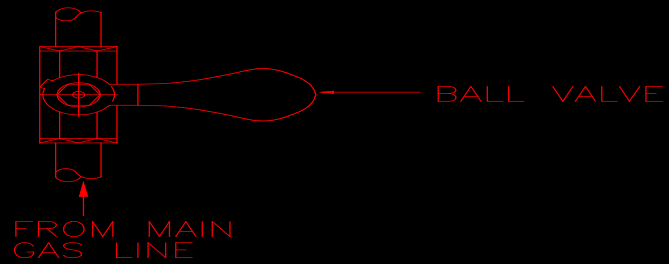
- Two banks of cylinders
 - portable cylinder, commonly used in Malaysia market 12 kg, 14kg and 50kg
 - Single unit or group (manifold system)
 - 50 kg- 21.8sm³
- Cylinder manifold
 - melting point 540 degree C
 - rigidly supported



MANIFOLD COMPLETE WITH
AUTOMATIC CHANGE-OVER REGULATOR



GAS MAIN LINE TO LABORATORIES



DETAILS 'B'

GAS PIPING

- Shall not be run/along drains
- Shall not run in walls but along surface
- Open end to be made gas tight
- Internally and externally free from dirt scale,dust.
- Paint 1 coat primer & two coats oil paint yellow
- Pipe sleeves for pipes passing through floor





CONSTRUCTION

- Competent personnel
- Material/Equipment
- Supervision
- Testing
- Commissioning

PRIVATE GAS LICENCE

- Means... A person supplying and using gas through a gas pipeline on his own property or premises or the property or premises of the owner or occupier

Competent Personnel

- Gas Engineer
- Gas Engineering Supervisor
- Gas Fitter Class I
- Gas Fitter Class II
- Gas Fitter Class III
- Second Schedule of the regulations

Gas Engineer

- Must have an Engineering Degree
- Registered as a Professional Engineer
- At least two years of relevant experience

SCOPE OF WORK OF COMPETENT PERSON (GENERAL)

- ENDORSEMENT OF PLAN, CERTIFICATE OF COMPLETION AND LEAKAGE TEST
- REPAIR OF GAS INSTALLATION
- MAINTENANCE OF GAS INSTALLATION

REGULATION 15

- **BEFORE COMMENCING WORK ON A NEW INSTALLATION OR GAS EXTENSION, SHALL APPLY AN APPROVAL TO INSTALL(ATI) CERTIFICATE**

APPROVAL TO INSTALL

SUPPORTING DOCUMENTS

- JBEG 3 FORM
- LETTER OF AWARD
- WORK SCHEDULE
- WELDER CERTIFICATE
- BP1 CERTIFICATE
- PIPE STRESS CALCULATION
- PIPE SIZING CALCULATION
- REPLENISHMENT OF CYLINDER
- LIST OF MATERIAL
- DRAWINGS

PIPEWORKS & FITTINGS

- Supports interval in accordance to MS 930 - 15mm(1.8m), 20-25(2.4m), 32mm(3m)
- Type of pipe used (G.I class C, Sch. 40,grade B-3.9mm,)
- Low pressure LPG pipe reticulation

PRESSURE GAUGES

- Installed after regulator to read outlet pressure correctly.
- Choose suitable range
- Automatic changeover - adjustable range of between 5 to 20 psi.

PRESSURE REGULATOR

- Fisher , rockwell, equimeter, jeavons
- first stage outlet pressure < 5 p.s.i
- second stage outlet pressure < 0.5 p.s.I
- shut-off valves
- vent line (1 m away from building)

REGULATION 116

- **NO PERSON SHALL ASSEMBLE OR MANUFACTURE, OR IMPORT A GAS FITTING, GAS APPLIANCE OR GAS EQUIPMENT WITHOUT GETTING THE APPROVAL OF JBEG**

REGULATION 117

- **NO GAS FITTING, GAS APPLIANCE OR GAS EQUIPMENT SHALL BE ASSEMBLED, MANUFACTURED, IMPORTED, SOLD OR USED UNLESS IT HAS BEEN TESTED AND CERTIFIED BY GOVERNMENT**

TESTING

- CLEAN ALL PIPES
- USE COMPRESSED AIR, INERT GAS
- TEST PRESSURE 2.5 TIMES OF MOP
BUT NOT LESS THAN 3 P.S.I
- DURATION 2 HRS

REGULATION 16

- **UPON COMPLETION OF A NEW GAS INSTALLATION WORK/GAS EXTENSION, SHALL APPLY AN APPROVAL TO OPERATE (ATO) CERTIFICATE**

APPROVAL TO OPERATE

SUPPORTING DOCUMENTS

- JBEG 3A FORM
- BORANG B(Perakuan Siap)
- BORANG C(Perakuan Ujian)
- REKOD UJIAN
- AS BUILT DRAWING
- PHOTO

COMMISSIONING

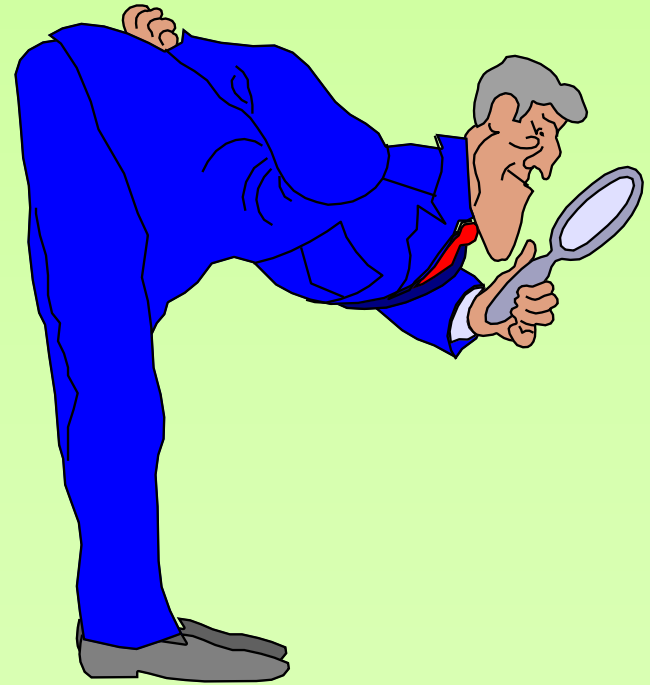
- Displacement of air from the pipework
- *Nitrogen injection equipment*
- *Oxygen content indicator- <2%*
- Displacement of Nitrogen with LPG
- *Inspect immediately & 24 hrs later*

MAINTENANCE

- REGULATION 128 STATES - OTHER THAN DOMESTIC GAS INSTALLATION, SHALL BE CHECKED, TESTED AND CERTIFIED EVERY TWO(2) YEARS.
- REGULATION 130(1) STATES ONLY COMPETENT PERSON SHALL CARRIED OUT SUCH MAINTENANCE

WARNING SIGN OF GAS LEAK

- ODOUR
- VGETATION
- INSECTS
- FUNGUS GROWTH
- SOUND
- HEAVY USAGE



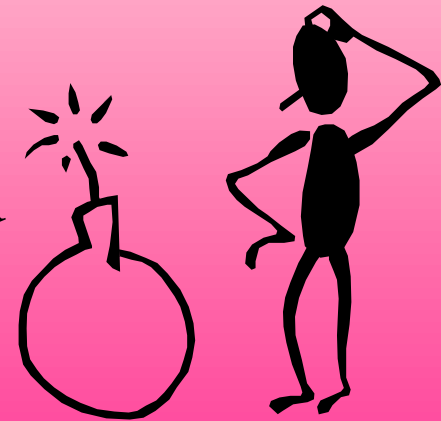
Responsibilities of the Contractor

- All items & materials approved by JBEG
- Obtain Approval To Install(ATI) letter
(drawings, calculation, contractor, welder's cert., procedure, reference no.)
- Obtain Approval To Operate(ATO) letter



Akta Bekalan Gas 1993 & Peraturan-Peraturan Gas 1997

- Denda tidak melebihi RM100,000 atau penjara tidak melebihi 5 tahun atau kedua-kedua nya
- Pengubahsuaian dan tambahan perlu mendapat kebenaran JBEG



CONCLUSION

- JBEG are given wider power under the Act. They can enter premises for inspection, issue notice with or without search warrant, remove, seal and suspend work.
- Therefore it is important the specific areas mentioned earlier must be given due considerations.