



MANAGEMENT OF CHANGE

AIGA 010/04

Asia Industrial Gases Association

298 Tiong Bahru Road, #20-01 Central Plaza, Singapore 168730
Tel: +65 62760160 Fax: +65 62749379
Internet: <http://www.asiaiga.org>



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1 Introduction

No modification shall be made to a plant, equipment, control systems, process conditions, and operating procedures without authorization from a responsible manager or his delegate.

Proposed modifications must be evaluated for Safety, Health and Environmental impact and a signed document should be available before the change can be implemented. The document should be signed for a second time before the equipment is released to become operational. This ensures the change has been carried out in accordance with the Management of Change document.

The Management of Change Procedure (MOC) is geared to safe process and equipment modification.

2 Scope and purpose

2.1 Scope

Depending on the scale or complexity of work, two authorization routes can be considered:

- I Changes within the authority of a plant site manager whose responsibility includes one or more of the following: (i) production of gases and liquefied gases, (ii) packaging of gases (iii) transportation of gas products, and (iv) customer gas facility installation; such approval limits need rigorous definitions to avoid problems.
- II Changes for which the site manager needs third party approval (e.g. design authority, safety department).

3 Principles of MOC

The principle for management and control of plant and equipment modification is divided into 8 stages:

3.1 Initiation

Generation of an improvement idea or a solution to a problem is communicated within a department, plant etc.

3.2 Appraisal

Evaluation of technical, operational, safety, environmental, quality and economical aspects of the change. Plant management will be provided with specialists to review the proposal. This is to prevent hasty or not well thought out changes being implemented. The review may identify additional information for decision-making.

3.3 Approval

The Management of Change documentation must be agreed by appropriate personnel, technical, safety, environmental and economical and final approval to be received by one manager overseeing the operations.

Design and engineering activities.

When necessary, the detailed design and engineering activities must be carried out for the modification.

3.4 Implementation

An implementation plan/program must be documented. The plan/programme may include purchasing, work planning, contractors, supervision etc

3.5 Verification

The change must be verified to ensure that it is in accordance with the change note and all relevant requirements prior to restarting the Changed Process.

3.6 Documentation

Update all relevant documentation such as product specifications, operating procedures, control logic documentation, alarm trips schedules, drawings and manuals, pressure test certificates, cleanliness certificates, training records, etc.

Trace and record the different changes with their date of change,

3.7 Training

Ensure that affected employees and contractors are trained on the impact of the change prior to the restart of the changed process.

3.8 Emergency MOC's

An Emergency MOC is a change that must be performed on a true emergency basis because of any of the following situations:

1. The process must be changed to correct a deficiency that would cause a hazardous condition that is an immediate threat to the safety and health of the site personnel or the public.
2. The process must be changed to prevent an immediate environmental release.
3. The process would be in jeopardy of not providing product to clients, owing to equipment failure or unforeseen design errors.

Emergency Changes must be reviewed and followed up.

4 Procedure

A typical Management of Change procedure is represented by MOC Form and flowchart (Page 8).

5 Checklist

The suggested Management of Change checklist should be used in the initial and appraisal stage to ensure that all safety aspects are covered and no omissions have been made.

Appendix 1 - Management of Change Procedure Safety Checklist Guidelines

1. Location - evaluation
 - explosion/fire
 - noise
 - utilities available
 - ground stability - foundation
 - drainage
 - neighbouring activities
 - mobile crane and FLT accessibility
 - site traffic control
 - third party risks
 - hazard quantifications
 - soil contamination
2. Equipment selection specifications
 - pre-purchase analysis
 - meeting design criteria and purchase order specifications
3. Material selection specifications
 - compatibility with product use
 - meeting/exceeding wall thickness and/or desired pressure
 - cleaned when required
 - electrical motors, panels, components and wiring conform to standards
 - fitness for intended purpose
4. Codes
 - do equipment and/or processes comply with applicable codes
 - pressure vessel and piping codes
 - fire protection
 - electrical
 - noise
 - emissions (air, water)
5. Cleaning procedures
 - oxygen cleaning
 - scrapped equipment to be cleaned
6. Welding/ brazing/testing procedures
 - special welding requirement with regard to materials, procedures or operating conditions
 - welding certificate
 - radiographic inspection requirement
 - brazing material, cryogenic/non cryogenic
 - welders qualifications
7. Pressure testing
 - approval test procedures available
 - hydraulic testing required
 - pneumatic testing
 - recording of testing done
 - pre-tested piping used - certificates yes/no
 - safety distances
 - certification by official bodies

8. Pressure protection
 - relief valves / bursting disc required due to pressure - temperature
 - relief valve in cryogenic piping between isolation points
 - relief devices on liquefied gas lines
 - over-protection pressure gauges
 - pressure protection vacuum system
 - under pressure protection system
 - are pressure protection relief's and bursting discs suitably sized + safety routed/vented
9. Temperature protection
 - safeguard personnel from hot/cold surfaces
 - alarms provided for high/low temperature in process
 - low temperature embrittlement of materials possible
 - materials protected against high temperature
10. Electrical system
 - electrical system conforms to regulations
 - grounding protection
 - identification voltage
 - main shut-off switch
 - lock/out capability
 - emergency switch
 - remote start/stop switches
 - electrical isolation considered
 - back-up system
 - overload protection electrical equipment
 - HV-transformers and cabling adequately isolated
 - equipment adequate protected against collision damage
11. Process equipment isolation
 - easy access to manual isolation valves
 - response time automatic isolation valves sufficient
 - fail safe isolation requirements met
12. Fire protection
 - hydrant available/accessible
 - fire hose lengths adequate to reach equipment area
 - fire extinguishers
 - alarm system at or near equipment area
 - automatic systems required
 - fire detectors
13. Equipment guards - protective shields/barriers
 - machine guards on rotating equipment
 - guard rails
 - bumper posts
 - oxygen flash protective shields/barriers
 - noise reduction
14. Ventilation/air monitoring
 - release of inert/toxic flammable gases possible
 - present natural ventilation sufficient
 - forced ventilation required
 - TLV values considered
 - monitoring required (e.g. O₂ level)
 - local aspiration required

15. Access to control equipment
 - locate to be maintained easily
 - install stationary ladder, platform, guardrails
16. Labelling (piping, panels, etc.)
 - process identification by labelling
 - chemical lines
 - process piping
 - high voltage identification
 - flammable storage
 - toxic storage
17. Drawing updates
 - construction drawing
 - P&I diagrams
 - electrical diagrams
 - instrument loop diagrams
 - fire protection diagrams
18. Warning signs/warning devices
 - mandatory signs in place : atmospheric hazard warning chemical hazard warning flammable product warning automatic machine start warning
 - back-up (power, instrument air)
 - alarms and signalisation
19. Environmental emissions/ Permits
 - noise within limit (industrial residential)
 - air emission control/testing; required permits available
 - water discharge
 - contamination municipal sewer possible contamination canals, etc. possible
 - permits available
 - contaminations of soil or groundwater possible
 - control of combustion equipment (boilers, etc.)
 - Spillage Control
20. Hazardous waste
 - waste accumulation and quantity
 - permits required
 - storage and disposal procedures
 - disposal route according law
 - disposal of non hazardous
21. Product control measures
 - MSDS for Chemicals available.
22. Access and Egress
 - Exit doors not blocked by equipment or piping
 - equipment room doors equipped with panic bar
 - area lighting adequate, emergency lighting available
 - eliminate tripping hazards on exit routes
 - where required, stairs and/or permanent ladders provided to aid egress
 - two exits where necessary
23. Tripping hazards
 - conduits, pipes, valves, etc. not located in walkways
 - eliminate tripping potential
 - floor opening covers level with grade
 - storage does not protrude into walkways

24. Sharp edges - Protruding obstacles
 - round off sharp edges or give protection
 - clearance on overhead pipes etc.
 - valve handle direction away from persons
25. Equipment lockout capability
 - electrical
 - mechanical
26. Emergency shower/eve wash
 - chemicals used requiring special wash
27. Emergency procedure
 - emergency plans to be revised
 - special training required
28. Operating procedure
 - operating procedure to be revised
 - additional job training necessary
 - safety aspects recognized
 - revision of pre-start and post stop instructions
 - Workplace risk assessments/Job Safety Analysis available or completed.
29. Contractors
 - selection
 - training
 - co-ordination
 - supervision
 - work permits
30. Operators training
 - training should include but is not limited to:
 - start-up/shutdown procedure
 - instrumentation control method
 - operating temperatures and pressures
 - alarms and shutdowns
 - vibration control
 - electrical isolation procedure
 - normal log control - i.e. daily temperatures/pressures, etc.
 - confined space entry procedure
 - emergency procedures
31. Personal protection equipment
other than "normal" equipment required
 - respirators
 - fire resistant clothing
 - chemical protecting garments etc.
32. Lifting devices - Lifting
 - well balanced eyebolt or similar on equipment
Warning : single point hoisting/lifting might overstress the lifting device, causing rupture
 - control weight restrictions and movement.
 - FLT training
33. Control of constructors
 - introduction training, incl. asphyxiation- and fire hazards
 - work permit
 - control of cranes
 - product hazards
 - digging operation/excavations

34. Software Changes
- Control loop changes
 - Addition or deletion of software modules
 - Restructuring of loops
 - New control loop
 - Putting loops on or off.
35. - Critical Trips/Interlocks.
36. - Spare Parts Identified and ordered.

Appendix 2 - Management of Change Procedure

MANAGEMENT OF CHANGE PROCEDURE

Location : _____ Date : _____ Product: _____
 Modification description : _____

Equipment : 0 new 0 modified 0 relocated
 Process : 0 change 0 extension 0

Max/Min pressure: _____ Max/Min temp : _____
 Chemical react. : _____ Misc. (toxic) : _____

Check off all items carefully. Use enclosed MOC Guideline.

- | | | |
|----|---|---|
| 1 | 0 | Site evaluation |
| 2 | 0 | Equipment selection specifications |
| 3 | 0 | Material selection specifications |
| 4 | 0 | Codes |
| 5 | 0 | Oxygen cleaning procedures |
| 6 | 0 | Welding/testing procedures |
| 7 | 0 | Pressure testing procedures |
| 8 | 0 | Overpressure protection |
| 9 | 0 | High/low temperature protection |
| 10 | 0 | Electrical system |
| 11 | 0 | Process and/or equipment isolation |
| 12 | 0 | Fire protection |
| 13 | 0 | Equipment guards - protection shields/barriers |
| 14 | 0 | Ventilation - air monitoring |
| 15 | 0 | Access to control equipment |
| 16 | 0 | Labelling (piping, panels, etc.) |
| 17 | 0 | Drawing updating |
| 18 | 0 | Warning signs, warning devices |
| 19 | 0 | Environmental emissions/ Permits |
| 20 | 0 | Hazardous waste |
| 21 | 0 | Product or chemical spill control measures |
| 22 | 0 | Access and Egress from buildings, enclosures, equipment |
| 23 | 0 | Tripping hazards |
| 24 | 0 | Sharp edges - protruding obstacles |
| 25 | 0 | Equipment lockout capability |
| 26 | 0 | Emergency shower/eye wash requirement |
| 27 | 0 | Emergency procedure |
| 28 | 0 | Operating procedure |
| 29 | 0 | Contractors |
| 30 | 0 | Operators training |
| 31 | 0 | Personal protection equipment |
| 32 | 0 | Lifting devices |
| 33 | 0 | Control of constructors |
| 34 | 0 | Software Changes |
| 35 | 0 | Critical Trips/ interlocks |
| 36 | 0 | Spare Parts |
| 37 | 0 | Workplace Risk Assessment |

MOC Review and Approval

Include here the listing of the people with their department of assignment: Design, Operation, Methods, Safety,...

Initial Review by:.....

Date :

Department:

Signature:.....

Approval before commencement of Change

Reviewed and agreed by.....

Department:.....

With/without comments:

Date:

Signature:.....

This change (specify here the change) is approved for release

(Plant manager or delegate)

Name :

Date :

Residual work completed

Date :

Persons trained / to be trained in change

Name

Department

Date

Appendix 3 – MOC Procedure

