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Approval process

审批过程

	Name 姓名	Title 职务	Signature 签名	Date 日期
Drafted by 起草人	Xu Guangxiang 许光祥	EHS Officer		
Reviewed by 审阅人	Eran Galor; Shaogang Chen 陈少刚; Sehoon Park; Vijaykumar Jadhav; Ehud (Udi) Sarig;	Deputy General Director; PVC assistant & Safety coordinator; Academy Safety Representative; MSE Safety Representative; BFE Safety Representative;		
Approved by 批准人		Campus Safety Committee;		

Reversion records

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Relevant departments (select relevant departments with a “√”)

相关部门 (用√勾选相关部门)

Construction Dept. 校园建设部	√	Operation Dept. 校园运营部	√	H.R. Dept. 人力资源部	√
RIGS 研究创新和研究生部	√	U.G. Dept. 本科教学部	√	I.T.Dept. 电脑信息部	√

Relevant documents 相关文件

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1. Purpose 目的

The purpose of this procedure is to ensure that the hazards associated with a specific job are identified, discussed and all controlled measures have been put in place and acknowledged by those who perform the job related to confined space.

此程序的目的是为了确保作业人员识别并了解所有特定相关密闭空间任务的危险，并实施所有控制措施。

2. Scope 适用范围

The scope of this procedure is applicable to all entry into confined spaces in GTIIT, include water tanks, vessels, drums, inside pipelines, exhaust ducts, container, underground well, tunnels, pit, trench, tunnels, drains, sewers, ventilations and so on.

此程序适用于 GTIIT 内所有的局限空间进入作业。包括水箱、烟道、地下井、坑、沟、渠、下水道、通风管线等。

3. Responsibilities 责任

3.1 Responsibility of confined space work operators(contractors)局限空间作业人员（包括承包商）职责

- Obey confine space work safety instruction and site actual requirement;
严格遵守受限空间作业操作规程和现场要求进行安全操作；
- Be familiar with working plan, safety plan and emergency response plan;
作业前应熟悉施工方案，安全方案和应急处理方案；
- Ensure safety protection measures in place.
确认安全防护措施落实情况；

3.2 Responsibility of HSE. 健康/安全/环保职责

- Responsible for develop and maintain the confined space work procedure;
负责制定，管理和维护程序，负责程序的执行；
- Provide relevant confined space work training and audit;
提供安全培训，监督和考核；
- Provide safety technical service and support;
负责对受限空间作业管理程序的执行提供咨询，支持和审核；

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4. Definitions 定义

- **Confined space 局限空间**

- Confined space is required for entering any enclosure that is not designed for continuous employee occupancy (e.a. pipelines, blenders, tanks, sewers, exhaust ducts, vessels, dust collectors).

密闭空间是进入封闭式空间,该场所不用于员工进行连续工作。例如:管道、储罐、储存池、下水道、通风管、各种除尘器。

- Entering is defined as entering the confined space opening with any part of the body, e.a. entering your head into a reactor manhole or ventilation ducts.

进入定义为身体任何部位进入密闭空间。例如, 使你的头部伸入反应器检修孔或除尘器。

- New vessels, idle vessels, or vessels that have never contained chemicals are covered by this procedure.

新容器, 闲置容器或未含有化学物质的容器均属于该程序。

- All pits, 1.5m or deeper are considered as confined spaces. If entry or exit is limited or restricted, pits of any depth are considered confined spaces.

所有 1.5m 或更深的积坑都被定义为密闭空间。如果在空间内进出受到限制, 则任何深度的积坑均被认为是密闭空间。

5. Procedures 程序

5.1 General Requirement for Confined Space Work Operation 局限空间作业一般要求

- Designate a safety watcher for the confined space work operation.

对于所有适用的局限空间作业, 必须安排一个安全监护人。

- If one safety watcher cannot observe all the qualified workers, additional safety watcher(s) must be assigned.

若安全监督员无法观察所有的工作人员, 必须安排额外的安全监督员。

- Ensure the house keeping of the work place in preparation during the execution of the work and after completing work to recover work site.

在工作准备、执行期间, 以及工作完成后, 确保工作场地的整洁。

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5.2 Preparation steps for confined space work 局限空间作业前的准备工作

5.2.1 Risk assessment 风险评估

- Prepare the risk evaluation according to confined space work content and working area. Prepare the relevant control measure according to evaluation result and develop safety operation plan or JSA.

根据局限空间类型、作业内容、作业环境等方面进行风险评估，根据风险评估的结果制定相应的控制措施，必要时编制安全施工方案，如工作安全分析；

- Check the equipment and facility according to equipment checking list to make sure they are at good conditions.

根据设备清单检查作业的设备及工具，确保设备的安全可靠性；

- If some working content involve special work, such as: welding. Checking welder's certificate is mandatory. The certificate must be copied and kept as a attachment for work permit.

涉及到特殊工种作业的（比如电焊/气焊等），要将特种作业人员操作证书作为动火作业许可证的其中一项附件进行提交；

- Provide P&ID drawing for work permit attachment. There is clear description for actual working content.

提供施工图纸，并在图纸内清楚列明与工作存在影响的管线和能源作为许可证附件。

5.2.2 Isolation and lockout: 隔离和挂牌上锁

- Opening process or utility lines and equipment have to be executed according to the requirement of line breaking and control of hazardous energy.

断开工艺或公用管道设备必须按照危险能量的控制（上锁/挂牌）要求执行。

- Complete separation of the confined space is mandatory to prevent entry of hazardous substances. All equipment and sources of potential hazardous energy shall be de-energized.

为防止危险物质进入，必须将密闭空间完全隔离，并切断所有设备和潜在危险能量来源。

- All connectivity with other systems that may endanger the operation should take effective isolation measures.

受限空间与其他系统连通的可能危及安全作业的管道应采取有效隔离措施。

- Pipeline isolation can be inserted a blind-board or removal a pipeline, water-seal and valve closed cannot be considered as physical isolation.

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管道安全隔绝可采用拆除一段管道，加入盲板等方式进行隔离，不能用水封或关闭阀门等代替盲板或拆除管道。


- All holes connected to the confined space could endanger the operation should be closed strictly.
与受限空间相连通的可危及安全作业的孔、洞应进行严密地封堵。
- The electrical equipment of the confined space must be cut off power after shutdown, implement the lockout and tag-out procedure strictly.
受限空间带有搅拌器等用电设备时，应在停机后切断电源，挂牌上锁。

5.2.3 Decontamination: 污染排除

- Prior to the execution of a confined space work, the confined space must be completely emptied, flushed, cleaned and free of any chemical substance (e.a. N₂).
执行密闭空间作业前,必须将密闭空间完全清空、吹扫、清洗且驱除所有化学物质(例如,氮气)。
- Purging and washing must be conducted according to the properties of the materials contained, and meet the standard below:
受限空间作业前，应根据受限空间盛装（过）的物料的特性，对受限空间进行清洗或置换，并达到下列要求：
 - Oxygen content is generally 19% to 21%, in oxygen-rich environment no more than 23.5%;
氧含量一般为 19%~21%，在富氧环境下不得大于 23.5%；
 - Toxic gases(substances) concentration should meet the standard requirements;
有毒气体（物质）浓度应符合标准的规定；
 - Must low than 10% LEL, refer to material MSDS.
必须低于空气最低爆炸极限的 10%,参照物料的安全数据表。

5.2.4 Ventilation and PPE: 通风和个人防护设备

- Air ventilation shall be provided through the confined space to prevent the accumulation of harmful vapors.
为防止有害气体的聚集,必须将密闭空间通风。
- For all confined space entry, an independent breathing air supply provided by breathing air cylinders system is mandatory.
进入密闭空间,使用呼吸空气供给,提供独立的空气供应。
- Confined space entering always requires harness and lifeline.


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进入密闭空间需要安全带和救生索。

- Open the manholes, hand-holes, exhaust duct or other ventilate facilities, and force ventilation is mandatory, to maintain good air circulations.
打开人孔、手孔、烟门等与大气相通的设施进行自然通风，必要时，可采取强制通风；并保持受限空间空气良好流通，存在易燃易爆气体环境内，必须使用防爆风机；
- Prohibit filling oxygen or oxygen-rich air into confined space;
禁止向受限空间充氧气或富氧空气；
- When vent with pipeline, the air supply and content of the pipe must be confirmed before vent;
采用管道送风时，送风前应对管道内介质和风源进行分析确认；
- In an explosive confined space, the operator should wear anti-static work cloth, anti-static work shoes, use explosion-proof lamps and no spark tools.
在易燃易爆的受限空间作业时，应穿防静电工作服、工作鞋，使用防爆型低压灯具及不产生火花的工具；
- Under hypoxia or toxic environment in confined space, gas mask must be equipped.
在缺氧或有毒的受限空间作业时，应佩戴隔离式防护面具；
- In the acid and alkali corrosive confined space, the operator should equip with acid-resistant work cloth, acid-resistant safety shoes, and chemical-resistant gloves and so on.
在有酸碱等腐蚀性介质的受限空间作业时，应根据环境和物料性质佩戴好防酸碱工作服、工作鞋、手套等护品；
- In the noisy confined space, the operator should wear ear-plug or earmuffs.
在产生噪声的受限空间作业时，应配戴耳塞或耳罩等防噪声护具；

5.2.5 Atmosphere testing: 气体测试

- Prior to initial entry or re-entry after leaving, the confined space atmosphere shall be tested before entry for oxygen, flammable gas, solvents, and toxic vapors etc. This atmosphere test has to be repeated at least once per hour.
初次进入之前或离开后再次进入,进行密闭空间作业前必须对工作区域内空气进行测试,包括氧气、易燃气体、有毒气体等。该空气测试至少每小时重复一次。
- In deep vessels an extension hose should be utilized for testing oxygen and flammables, the testing has to be done on the bottom, middle level and in blind spots to ensure there are no enclosed gasses.

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对深的容器中需使用延长软管测试氧气和易燃气体,测试中部、底部和不可见区域,确保无存在有害气体。

- Analysis instrument should be inspected period, pump test and make sure in a normal work condition before use.

分析仪器应在校验有效期内，使用前应进行碰撞试验，并确保其处于正常工作状态；

- Sampling points should be representative, should sampling at the upper, middle and lower position in a large volume vessel.

采样点应有代表性，容积较大的受限空间，应采取上、中、下各部位取样；

- Monitor regularly during the work, increase the frequency if the analyzing results are obviously different.

作业中应定时监测，如监测分析结果有明显变化，则应加大监测频率；

- When the work interruption for more than 30 minutes, one more monitor and analysis must be conduct, continuously monitor should raise to the harmful substances; stop work and evacuate immediately when abnormal condition occurred, after the site disposal, re-monitor and re-analysis to ensure the safety condition before comeback to work.

作业中断超过 30 分钟应重新进行监测分析，对可能释放有害物质的受限空间，应连续监测；情况异常时应立即停止作业，撤离人员，经过对现场处理，并取样分析合格后方可恢复作业；

- Brushing with a volatile solvent coating, should make continuous monitor, and taking the forced ventilation measures;

涂刷具有挥发性溶剂的涂料时，应做连续监测，并采取强制通风措施；


- Sampling depth or sapling into the confined space should taking personal protective measures according to the requirements.

采样人员深入或探入受限空间采样时应采取符合规定的个人防护措施。

5.2.6 Explosive measurements: 爆炸措施

- When the explosive gases concentration is more than 10%LEL, stop work immediately, confirm the work environment in a safety condition before the work re-start.

当被测气体或蒸气在空气混合物中的体积比浓度大于或等于爆炸下限 10%时，则必须立即停止作业，确保作业环境可靠方可重新恢复作业。

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5.2.7 Compressed gas cylinders : 压缩气瓶

- No any gas cylinders shall be taken into a confined space.
禁止将气瓶放置在密闭空间内。

5.2.8 Lighting and electrical 照明及用电

- The lighting voltage should be less than or equal to 36V in confined space, should be less than or equal to 12V in a wet and narrow conditions.
受限空间照明电压应小于等于 36V，在潮湿容器、狭小容器内作业电压应小于等于 12V；
- Use more than the safe voltage electric tools or electric welding equipment, the electric leakage protector must be equipped. In the wet container, the operator should stand in the insulating board, and ensuring the reliability of grounding of the metal container;
使用超过安全电压的手持电动工具作业或进行电焊作业时，应配备漏电保护器。在潮湿容器中，作业人员应站在绝缘板上，同时保证金属容器接地可靠；
- The temporary use of electricity should follow the electric charge process(such as apply for temporary power)
临时用电应办理用电手续(如：申请临时延长用电线路)

5.3 Before working 施工前

- Follow confined space work working plan;
局限空间作业过程中应严格按照安全措施或安全工作方案的要求进行作业；
- If involving others special works, operators must follow other special working safety procedure instruction on basis of the confined space work operation.
局限空间作业中如果涉及其他特种作业，则必须在依据局限空间作业要求的基础上，严格遵循其他特种作业的要求；
- Conducting all measurements as required prior to release the work permit.
在工作许可证签发前，执行所有要求的措施。必须了解所有在工作执行期间可能发生的危险。
(化学物质品/各种物质)
- The safety watcher confirms the testing time by signature during the execution of the work.
在工作执行期间，安全监督员通过签名确定测试时间。
- Ensuring that all safety measures, mentioned on the work permit, are continuously guarded during the complete duration of the work. (e.g. isolation, ventilation)

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确保所有工作许可证中提及的安全措施，工作执行期间始终进行监护。（如隔离，通风措施等）

- Ensuring the fire-fighting equipment and emergency tools is prepared and in available condition;
确保消防器材和应急器材准备好并且处于可用的状态；

5.4 During working 施工期间

- Unrelated tools and goods are not allowed to take into the confined space, and the operators are not allowed to throw any materials, tools and other goods in the confined space.
作业人员不得携带与作业无关的物品进入受限空间，作业中不得抛掷材料、工器具等物品。
- In the process of operation the gas mask is prohibited to take off(especial in toxic ,suffocating environment)
禁止作业人员在作业过程中摘下防毒面具（尤其是有毒、窒息的环境下）。
- The safety watcher must keep communication with the operators, ensure the operator is in good condition;
安全监督人员与作业人员必须保持联系，确保作业人员处于安全状态。
- SCBA (breathing apparatus) fire equipment and water supply should be prepared outside the confined space for emergency use.
受限空间外应备有空气呼吸器(氧气呼吸器)、消防器材和清水等相应的应急用品。
- Difficulty, large labor intensity and long time work in confined space should adopt the rotation operations.
难度大、劳动强度大、时间长的受限空间作业应采取轮换作业。
- Work at height in confined space should also refer to the requirements of overhead work process.
在受限空间进行高处作业应同时参考“GTIIT-GP-HSEQ-049 高空作业许可程序”的要求进行。
- Hot work in confined space should also refer to the requirements of the hot work.
在受限空间进行动火作业应同时参考“GTIIT-GP-HSEQ-050 动火作业程序”的要求进行。
- The entrances and exits should be kept open;
受限空间出入口应保持畅通。
- Multi-work, multi-layer cross-operation should take precaution measures to avoid harm to each other;
多工种、多层交叉作业应采取互相之间避免伤害的措施。
- Once any abnormal operations occurred, such as the operator feel discomfort or difficulty to breathing, should send a signal to the safety watcher immediately and evacuate quickly.

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在作业中如出现异常情况或感到不适或呼吸困难时，应立即向作业监护人发出信号，迅速撤离现场。

- Trigger the alarm in the event of a fire.
发生火灾时启动警报。
- Attempt to put out the fire only when it is safe to do so.
只在火灾可扑灭的情况下才进行灭火。
- To stop all work activities when the hazardous situation is changed against the safety situation mentioned on the work permit.
当发生不同于工作许可证中提到的危险情形时，应停止所有的工作。
- Ensure the posting the work permit (bottom sheet) in the near vicinity of the work place.
确保在工作区域附近张贴工作许可证（底页白联）。
- Setting all barricades and hanging out warning/danger signs. More specific to confined space, the safety watcher must guard openings of removed covers (e.g. manholes) by appropriate barricades to prevent accidental fall through openings.
设置路障并张贴安全警示标志。对于密闭空间需特别的监护，安全监督员必须在密闭空间(例如人孔、检修孔)外进行监护,设置路障，防止孔盖或者其他物品等意外坠落。

5.5 After working 施工结束后

- Inspect the equipment and tools list, ensure all the equipment/tools are intact and bring out of the confined space.
检查设备、工具清单，确保所有带入的设备、工具完好无损，并带出局限空间；
- Inspect insider the container, cleaning away the waste and rag, can't be left in the container;
对容器内部进行检查，清理废弃物，不能遗留在容器中；
- Ensure all operator came out the container, and then liberalizing energy isolation measures;
确保所有人员从容器中出来，才能解除能源隔离措施；
- Ensure all facility recover to normal condition and inspect by the owner, especial the cleaning of blind board;
确保设备恢复到正常的工作状态，并经过现场人员检查，尤其是盲板的清除等；
- Inspect the adjacent areas and ensure there is no abnormal occurred.
对周围环境进行检查，确认无异常后方可离开现场。

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6. REFERENCE 参考资料

GB 30871-2014 Safety Code of special work in chemical manufactory

化学品生产单位特殊作业安全规范GB 30871-2014

7. ATTACHMENT & APPENDIX 附件