

Information sharing Process Safety Critical Equipment (PSCE) Management

PSCE database available on site intranet listing PSCE per zone.

There are 22 PSCE categories:

1. Pressure relief devices (Relief valves, Vacuum breakers, Bursting Discs, Explosion Hatches, etc.) & Flare Systems.
2. Instrumented Protective Function (**IPF - referred to commonly as Trips**)
3. Fire water mains + pumps
4. Fire water monitors
5. Deluge systems
6. Process Safety Critical Alarms
7. Pump Dual seals
8. Rotating equipment required in case of emergency (Fire water system, Breathing Air, FW diesel compressor,)
9. Sewer systems
10. Fire & Gas detectors (Flame and gas detectors)
11. Process Safety Critical Non-return valves (**NRVs**)
12. Isolation Valves (Remote operated valves), Emergency depressurising valves (EDPs) and valves required in case of emergency
13. Snuffing steam and Steam rings for flanges and for furnaces
14. Steam or electrical tracing for RV's inlet and / or discharge piping
15. Flame arrestors
16. Foam pourers
17. Breathing air reels
18. Smoke detectors
19. Diesel generators for FARs
20. Fireproofing
21. Process unit and equipment CCTV (cameras)
22. Auxiliary Emergency Equipment (Fire trucks and other emergency response equipment)

Critical activities and Interim Measures

What are Critical Activities (C.A)?

These are activities (operational or maintenance) that ensure that barriers are healthy. Process Safety Critical Equipment need to be checked to ensure that they will function correctly when required. If a PSCE is not tested for functionality, it might not work to prevent an incident and this is as good as not having a barrier in place.

Examples of operational activities

- Testing of fire hydrants/ deluge systems.
- Checking that RVs are commissioned and steam/electrical heat tracing are commissioned and effective.
- Witnessing of alarm testing and trip testing.

Example of maintenance activities referred to as PM tasks

- Pressure testing and setting of RVs at RV workshop.
- Trip testing of instruments.
- Checking the health of PS Critical NRVs.
- Sewer flow testing.

Process Safety Fundamental: 3



Fundamental 3
Take interim mitigation
measures in case of failure
of PSCE

What are Interim Measures?

- If PSCE fail or become unavailable for the process (e.g. faulty equipment), interim measures must be put in place to prevent LOPCs or process safety incidents. Recall PSF #3.

Example of an interim measure/ mitigation:

While conducting weekly equipment health checks, it was discovered that the unit fire hydrants have low water pressure. This was reported and entered into the maintenance system. **As a mitigation mobile monitors were set up to be commissioned in case of an LOPC / Fire until the hydrants pressure was restored.**

Maintenance of PSCE

Maintenance role for Process Safety Critical Equipment:

- **Execute Preventative Maintenance**
 - Carry out PM maintenance within the agreed time frame.

- **Execute repair**
 - All reactive jobs on PSCE to be completed in the shortest duration, as per Guideline in upcoming slide, to ensure that equipment is returned in an operable state thus ensuring effectiveness of it as a barrier e.g. Firewater pumps have an immediate repair duration if not spared.

- **Capture Equipment history**
 - As-found condition
 - Repair history.
 - Unrevealed failures

Maximum Repair Duration Guideline

Equipment	Type	Maximum Repair Duration	Location of equipment history	Mitigation	Responsible Discipline	Comment/Remarks
Vessel		As per EI	IDMS		Inspection	
Relief Valve		Immediately, if non spared	IDMS	If spare RV not available then generate MOC to guarantee open path to next	Inspection	Damaged RV to be repaired within a week
Tank		As per EI	IDMS		Inspection	N/A
Exchanger		As per EI	IDMS		Inspection	N/A
Instrument Protective Function		Schedule breaker (within 1 day)	IPF database/PACER	Follow OOS/MOS procedure	Instrumentation	N/A
Critical Alarms	General	Within 1 week	IPF database/PACER	Follow disable alarms procedure	Instrumentation	If parts available then default timing changes to within 1 day.
	Tanks	Within 1 week	IPF database/PACER	Follow disable alarms procedure. Find an alternate way to measure the level	Instrumentation	Back up reading from IPF measurement. If parts available then default timing changes to within 1
Critical Pumps		30 days	PACER	If spared increase monitoring by OPS & CM	Operation/ Condition Monitoring	Escalate if condition deteriorates. Pump out for maintenance's priority increase and Repair duration shorten.
Emergency Response	Hydrant Deluge System	30 Days	PACER	See NFPA	Firestation	N/A
	Fire water Pumps	Immediately if not spared	PACER	See NFPA	Firestation	Engage with Diesel service provide for Driver
	Fire & Gas Detection	Schedule breaker (within 1 day)	PACER	NFPA20/Temporary detection, Increased operator rounds, Restrict work	Firestation	Valid if spares are readily available
Critical Electrical		Within 1 week	PACER	Apply MOC to define appropriate interim	Electrical	N/A
Critical NRV		Before Start up at the end TA	IDMS/PACER	If repairs cannot be done before start up then MOC is to be followed	TA/Inspection	MOC to be completed for NRV that have failed during normal
Sewers Systems		Clean sewer pits inlet and outlets within 1 week	PACER	Notify Emergency response team and OPS to ensure awareness	Maintenance	Take into account weather conditions
Pump Seals(Hazardous Services)		Immediately if not spared	PACER	If spare pump not available then generate MOC to be followed or unit shutdown.	RE/Maintenance	Damaged Pump to be repaired depending on
Critical Valve	Tank Bends	Within 1 week	PACER	Develop alternates e.g. sand bagging	Civil/Firestation	N/A
	Isolation and Depressurising systems	Before Start up at the end TA	PACER	If repairs cannot be done before start up then MOC is to be followed	Instruments	MOC to be completed for valve that have failed during normal Operation. Review spare part
Critical Steam Tracing		Within 1 week	Apply MOC to define appropriate interim		Maintenance	N/A