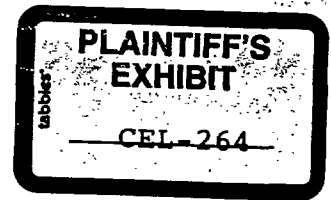


SAFETY

E 13-3.1



**ENGINEERING
STANDARD**

CHECK LIST FOR ENGINEERING PROJECTS

CELANESE CORPORATION OF AMERICA

**Central Engineering
Charlotte Office**

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Approved Nov. 2, 1961

CELANESE CORPORATION OF AMERICA SAFETY CHECK LIST FOR ENGINEERING PROJECTS Sponsor - Celco		ENGINEERING STANDARD E13-3.1
Issued 11/2/61	Rev. No.	Date

1. SCOPE

This standard provides a check list for accident and fire prevention and fire protection measures to serve as a guide for Plant Engineers, Project Engineers, and Supervisors of Safety & Plant Protection when planning new work, new projects, and modifications to existing facilities.

2. GENERAL

When planning new projects, or new facilities, this Safety and Fire Protection Check List is a useful reminder for Plant Engineers, Project Engineers, Supervisors of Safety & Plant Protection, and Manufacturing Department personnel to help assure that all the features, for safety from accidents, fire, and explosion, are incorporated into the planning and engineering stage before work is actually started. The requirements of local, state, federal, and provincial codes should also be observed.

3. CHECK LIST

3.1 Location

- 1) Accessibility
- 2) Traffic - vehicular and pedestrian
- 3) Parking areas - entrance, exits, drainage, lighting, enclosures
- 4) Clearances - buildings for railroad traffic and vehicles (overhead - width - turnarounds)
- 5) Drainage
- 6) Road locations, markings
- 7) Entrances, exits - foot, traffic, truck, railroad

3.2 Buildings

- 1) Wind pressure - snow loads - floor loads - earthquake design
- 2) Roof material - anchorage
- 3) Roof vents and drains, smoke dispersal
- 4) Stairwells - ramps - lighting
- 5) Elevators - dumbwaiters
- 6) Fire walls - openings - fire doors
- 7) Explosion relief
- 8) Exits - fire escapes, identification, safety tread
- 9) Record storage

- 10) Ventilation - fans, blowers, air conditioning, scrubbing of toxic vapors, location of exhausts, inlets, smoke and heat ventilation dampers, fire curtains
- 11) Lightning protection, structural and equipment grounding for electrical discharges
- 12) Building heaters - (hazardous or non-hazardous area) vents
- 13) Commodes, urinals, wash basins, showers, locker rooms - required number of each and air changes - ASA
- 14) Building drainage - inside and out
- 15) Structural steel and equipment fireproofing
- 16) Access ladders to roofs from outside ground level, escape ladders, fire escapes
- 17) Wall to segregate toilet and locker room
- 18) Bearing capacity of subsoil

3.3 Sprinklers, Hydrants and Mains

- 1) Water supply
- 2) Mains - loop system or dead end, cathodic protection, coated and wrapped
- 3) Hydrants - location
- 4) Automatic sprinklers - occupancy classification -
Wet systems - Dry systems - Deluge systems
- 5) Standpipes - tanks
- 6) Type, size, and number of first aid extinguishers needed
- 7) Fixed automatic extinguishing systems, CO₂, N₂, foam, dry powder
- 8) Fire pumps, number (approved)
- 9) Fire protection devices - rise in temperature alarms, sprinkler system flow alarms, photoelectric smoke and flame alarms

3.4 Electrical

- 1) Hazard classification
- 2) Accessibility of critical circuit breakers
- 3) Polarized outlets - grounded systems
- 4) Switches and breakers for critical equipment and machinery
- 5) Lighting - hazardous or non-hazardous areas - Light intensity - approved equipment - U.L. and F.M. - emergency lights
- 6) Telephones - hazardous or non-hazardous areas
- 7) Type of electrical distribution system - voltage, grounded or ungrounded, overhead, underground
- 8) Conduit, raceways, enclosures, corrosion consideration
- 9) Motor and circuit protection
- 10) Transformer location and types

3.5 Sewers

- 1) Chemical sewers, trapped, accessible clearouts, vents, locations, disposal, explosion hazards

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- 2) Sanitary sewers - treatment, disposal, traps, plugs, clearouts, vents
- 3) Storm sewers

3.6 Storage

3.61 General

- 1) Accessibility - entrances and exits, sizes
- 2) Sprinklered
- 3) Aisle space
- 4) Floor loading

3.62 Flammable liquids - gas, dust and powder

- 1) Closed systems
- 2) Areas to be sprinklered
- 3) Emergency vents, flame arrestors, relief valves - safe venting location
- 4) Floor drains to chemical sewers properly trapped
- 5) Ventilation - pressurized control rooms and/or equipment
- 6) Tanks, bins, silos - underground, above ground, distances, fireproof supports, dikes and drainage, pipeways, ducts
- 7) Foam system and deluge system
- 8) Refrigeration systems for critical chemicals

3.63 Raw materials

- 1) Dust collectors

3.64 Finished products

- 1) Loading facilities

3.65 Inert gas blanketing of hazardous products

3.7 Materials Handling

- 1) Truck loading and unloading facilities
- 2) Railroad loading and unloading facilities
- 3) Industrial truck - tractor - gasoline - electric diesel - liquified petroleum gas
- 4) Loading - unloading docks - grounding system for flammable liquids - rail - tank truck - truck trailer
- 5) Cranes - mobile - capacity marking, overload protection
- 6) Warehouse area, floor loading, and arrangement
- 7) Conveyors and their location in production areas
- 8) Flammable liquid storage - paints, oils, solvents
- 9) Disposal of waste chemicals or by-products

3.8 Machinery

3.81 Accessibility - maintenance - operations

- 1) Oil and grease fittings
- 2) Levers, control switches
- 3) Valves - installed to prevent obstructions
- 4) Inspection ports - install for accessibility

3.82 Emergency stop switches

3.83 Guards

3.9 Process

- 1) Chemicals - fire and health hazards
- 2) Compatibility - chemicals
- 3) Pressures and temperatures in processes
- 4) Critical pressures and temperatures
- 5) Relief devices - flame arrestors - need
- 6) Coded vessels and piping material suitable for planned chemicals
- 7) Measures for handling runaway reactions
- 8) Fixed fire protection systems - CO₂, foam, deluge
- 9) Are vessels properly vented, safe location, area
- 10) Permanent vacuum cleaning systems
- 11) Explosion barricades - isolation
- 12) Inert gas blanketing systems - listing of inert gas equipment to be blanketed
- 13) Emergency shutdown valves, switches, location from critical area, action time for delays
- 14) Fireproofing of metal supports
- 15) Safety devices for heat exchange equipment, vents, valves and drains
- 16) Expansion joints or expansion loops, process steam lines
- 17) Steam tracing - provision for relief of thermal expansion in heated lines
- 18) Insulation for personnel protection - hot process, steam lines and tracing
- 19) Static grounding for vessels and piping
- 20) Manholes, platforms, ladders, cleanout hole for maintenance in tanks and vessels
- 21) Provisions for corrosion control
- 22) Pipe line identification
- 23) Radiation hazards - measuring instruments containing radio-isotopes - X-rays - personal protection

3.10 Noise Limits for Equipment in Work Areas

- 1) Control valves

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- 2) High speed turbines
- 3) Axial compressors
- 4) Metiers, coning, twisting, cheesing departments
- 5) High speed filament cutters
- 6) Exhaust systems

3.11 Safety equipment & Facilities

- 1) Dispensary and equipment
- 2) Ambulance
- 3) Fire truck
- 4) Fire alarm system
- 5) Fire whistle and siren - departments - outside
- 6) Fire pumps - approved
- 7) Sanitary and process waste treatment
- 8) Snow removal and ice control equipment
- 9) Safety showers and/or eye wash fountains
- 10) Safety ladders and cages
- 11) Emergency equipment locations, gas masks, protective clothing, fire blankets, inside hose streams, stretchers
- 12) Laboratory safety shields
- 13) Watchmen stations
- 14) Hose houses, type, location, hose and allied equipment
- 15) Instruments, continuous analyzers for flammable vapors and gases, toxic vapors

4. REFERENCES

Sub-Section 3.2

Safeguarding structures against windstorm damage - F.I.A. (Pamphlet)
Building construction - 200 Series - N.F.P.A.
Sanitary facilities - A.S.A. (Pamphlet 24.1)
Handbook of Industrial Loss Prevention - (Recommended Practices
For The Protection of Property and Processes Against
Damage By Fire, Explosion, Lightning, Wind, Earthquake) -
F.M.
Recommended Good Practice For Safeguarding Class B and Class C
Furnaces and Ovens - F.I.A. Pamphlet
Celanese Standards

Sub-Section 3.3

Extinguishing appliances - 10 Series - N.F.P.A.

Extinguishing auxiliaries - 20 Series - N.F.P.A.
Installing sprinkler equipment - F.M. - Pamphlet 20
Specifications for laying fire mains - F.M. - Pamphlet 22.70
Anchoring fire mains - F.M. - Pamphlet 22.71
Underwriter's steam fire pumps - F.M. - Pamphlet 25.31
Centrifugal fire pumps - F.M. - Pamphlet 25.23
Celanese Standards

Sub-Section 3.4

National Electrical Code Art 500 - N.F.P.A.
U. L. List of Approved Equipment, yearly service
F. M. List of Approved Equipment, yearly service
Electrical equipment for textile, carpet, and cordage plants -
F.M. - Pamphlet 15.04
Switchgear - F.M. - Pamphlet 15.21
Celanese Standards

Sub-Section 3.5

Safety in Petroleum Refining and Related Industries - Armistead
Celanese Standards

Sub-Section 3.6

Safeguarding Flammable Liquids, Storage, and Processing - F.I.A.
Pamphlet
Safety in Petroleum Refining and Related Industries - Armistead
Flammable Liquids Code - N.F.P.A. - Pamphlet 30
National Fire Codes, Volume II - N.F.P.A.
Purging Principles and Practices - American Gas Association
Celanese Standards

Sub-Section 3.7

Refer U. L. and F.M. approvals, industrial trucks
Safety in Petroleum Refining and Related Industries - Armistead
Static Electricity - N.F.P.A. - Pamphlet 77M
Safeguarding Flammable Liquids - F.I.A. Pamphlet
Celanese Standards

Sub-Section 3.9

Unfired pressure vessels - A.S.M.E.
Flammable Liquids - 30 Series - N.F.P.A. Pamphlets
Gases - 50 Series - N.F.P.A. Pamphlets
Safety in Petroleum Refining and Related Industries - Armistead
Limits of Flammability of Gas and Vapors - Bulletin 503 - B.M.
Celanese Standards

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Sub-Section 3.10

Noise Reduction - Leo L. Beranck
Industrial Hygiene and Toxicology - Volume I - Frank A. Patty
Celanese Standards

Abbreviations

A.G.A. - American Gas Association, 420 Lexington Ave., New York
17, N. Y.
A.S.A. - American Standards Association, 10 East 40th St., New York
16, N. Y.
F.I.A. - Factory Insurance Association, 85 Woodland St., Hartford
2, Conn.
F.M. - Factory Mutual Engineering Div., 1151 Boston-Providence
Turnpike, Norwood, Mass.
N.F.P.A. - National Fire Protection Association, 60 Batterymarch
St., Boston, Mass.
B.M. - Bureau of Mines, Dept. of Interior, Washington, D. C.
A.S.M.E. - American Society of Mechanical Engineers, United Eng-
eering Center, 345 E. 47th St., New York 17, N. Y.
Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Illinois,
161 Sixth Avenue, New York 13, N. Y., 500 Sansome St., San Francisco,
11, California

Armistead, George

Safety in Petroleum Refining & Related Industries

John G. Simmonds & Co., 111 John St., New York 7, N. Y.

Patty, Frank A.

Industrial Hygiene Toxicology

Interscience Publishers, N. Y.

Beranck, Leo L.

Noise Reduction

McGraw Hill Book Company, New York

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