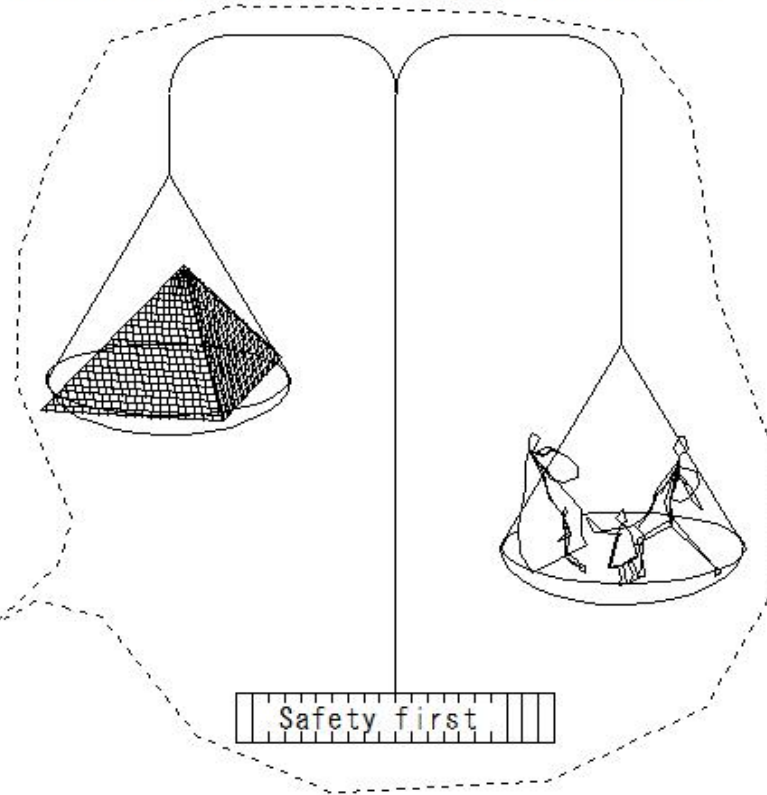
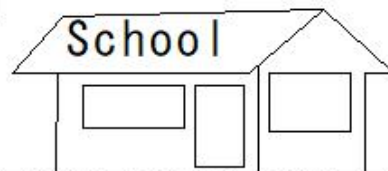
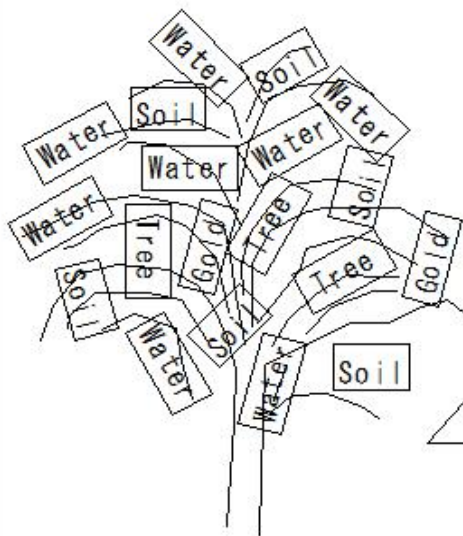


(02) Safety First(Illustration) in Africa(248-742)

(02) Safety First(Illustration) in Africa(248-742)



God never forget you !



只野敏夫
TADANO TOSHIO

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只野敏夫
Tadano Toshio

(S248) Open work
(S249) Debris flows
(S250) Machinery tip over
(S251) Danger of collapsing
(S252) Danger of collapsing
(S253) Foundation construction machinery
(S254) Foundation construction machinery
(S255) Foundation construction machinery
(S256) Mobile cranes
(S257) Mobile cranes
(S258) Signals
(S259) Signs
(S260) Standardization of storage locations
(S261) Standardization of alarms
(S262) Standardization of evacuation training
(S263) Education for new entrants
(S264) Prohibition of illegal instructions
(S265) Prohibition of illegal instructions
(S266) Prohibition of illegal instructions
(S267) Causes of disasters
(S268) Causes of disasters
(S269) Causes of disasters
(S270) Response in the event of a disaster
(S271) Response in the event of a disaster
(S272) Response in the event of a disaster
(S273) Accident type classification
(S274) Accident type classification
(S275) Accident type classification
(S276) Accident type classification
(S277) Accident type classification
(S278) Accident type classification
(S279) Accident type classification
(S280) Accident type classification
(S281) Accident type classification

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(S316)Safety measures for machinery
(S317)Safety measures for machinery
(S318)Safety measures for machinery
(S319)Flow of creating a work plan for construction machinery
(S320)Flow of creating a work plan for construction machinery
(S321)Flow of creating a work plan for construction machinery
(S322)Flow of creating a work plan for construction machinery
(S323) Specific work (mobile crane work, etc.)
(S324) Specific work (mobile crane work, etc.)
(S325) Specific work (mobile crane work, etc.)
(S326) Specific work (mobile crane work, etc.)
(S327) Specific work (mobile crane work, etc.)
(S328)General standards for machinery
(S329)General standards for machinery
(S330)General standards for machinery
(S331)General standards for machinery
(S332)General standards for machinery
(S333)General standards for machinery
(S334)General standards for machinery
(S335)General standards for machinery
(S336)General standards for machinery
(S337)General standards for machinery
(S338)Crane
(S339)Crane
(S340)Crane
(S341)Crane
(S342)Crane
(S343)Crane
(S344)Crane management
(S345)Crane management
(S346)Crane management
(S347)Crane management
(S348)Crane management
(S349)Crane management

Safety measures for machinery
Safety measures for machinery
Safety measures for machinery
Flow of creating a work plan for construction machinery
Flow of creating a work plan for construction machinery
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Flow of creating a work plan for construction machinery
Specific work (mobile crane work, etc.)
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General standards for machinery
Crane
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Crane management
Crane management
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Crane management
Crane management

(S384)Mobile crane management
(S385)Mobile crane management
(S386)Mobile crane management
(S387)Do not enter under a suspended load
(S388)Do not enter under a suspended load
(S389)Do not enter under a suspended load
(S390)Do not enter under a suspended load
(S391)Do not enter under a suspended load
(S392)Do not enter under a suspended load
(S393)Do not enter under a suspended load
(S394)How to use a mobile crane
(S395)How to use a mobile crane
(S396)How to use a mobile crane
(S397)How to use a mobile crane
(S398)How to use a mobile crane
(S399)How to use a mobile crane
(S400)How to use a mobile crane
(S401)How to use a mobile crane
(S402)How to use a mobile crane
(S403)Elevator safety work
(S404)Elevator safety work
(S405)Elevator safety work
(S406)Elevator safety work
(S407)Elevator safety work
(S408)Elevator safety work
(S409)Elevator safety work
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(S417)Elevator safety work

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(S452)Safe winch operation
(S453)Safe winch operation
(S454)Overview of wire rope
(S455)Overview of wire rope
(S456)Overview of wire rope
(S457)Overview of wire rope
(S458)Overview of wire rope
(S459)Overview of wire rope
(S460)Overview of wire rope
(S461)Overview of wire rope
(S462)Overview of wire rope
(S463)Overview of wire rope
(S464)Overview of wire rope
(S465)Overview of wire rope
(S466)How to fix wire rope
(S467)How to fix wire rope
(S468)How to fix wire rope
(S469)How to fix wire rope
(S470)How to fix wire rope
(S471)How to fix wire rope
(S472)How to fix wire rope
(S473)How to fix wire rope
(S474)How to fix wire rope
(S475)Wire rope for lifting
(S476)Wire rope for lifting
(S477)Wire rope for lifting
(S478)Wire rope for lifting
(S479)Wire rope for lifting
(S480)Wire rope for lifting
(S481)Wire rope for lifting
(S482)Wire rope for lifting
(S483)Wire rope for lifting
(S484)Wire rope for lifting
(S485)Wire rope for lifting

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(S486)Management of slinging equipment
(S487)Management of slinging equipment
(S488)Management of slinging equipment
(S489)Management of slinging equipment
(S490)Management of slinging equipment
(S491)Management of slinging equipment
(S492)Management of slinging equipment
(S492)Management of slinging equipment
(S493)Safety load of sling wire rope
(S494)Safety load of sling wire rope
(S495)Safety load of sling wire rope
(S496)Safety load of sling wire rope
(S498)Guidelines for safety in slinging work
(S499)Guidelines for safety in slinging work
(S500)Guidelines for safety in slinging work
(S501)Guidelines for safety in slinging work
(S502)Slinging procedure
(S503)Slinging procedure
(S504)Slinging procedure
(S505)Slinging procedure
(S506)Slinging procedure
(S507)Slinging procedure
(S508)Slinging procedure
(S509)Slinging method
(S510)Slinging method
(S511)Slinging method
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(S513)Slinging method
(S514)Slinging method
(S515)Slinging method
(S516)Slinging method
(S517)Slinging method
(S518)Belt slings for lifting
(S519)Belt slings for lifting

Management of slinging equipment
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Management of slinging equipment
Safety load of sling wire rope
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Guidelines for safety in slinging work
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Belt slings for lifting
Belt slings for lifting

- (S520)Belt slings for lifting
- (S521)Belt slings for lifting
- (S522)Construction machinery
- (S523)Construction machinery
- (S524)Construction machinery
- (S525)Construction machinery
- (S526)Construction machinery
- (S527)Construction machinery
- (S528)Safe operation-construction machinery
- (S529)Safe operation-construction machinery
- (S530)Safe operation-construction machinery
- (S531)Safe operation-construction machinery
- (S532)Safe operation-construction machinery
- (S533)Safe operation-construction machinery
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- (S542)Safe operation-construction machinery
- (S543)Safe operation-construction machinery
- (S544)Safe operation-construction machinery
- (S545)Safe operation-construction machinery
- (S546)Safe operation-construction machinery
- (S547)Safe operation-construction machinery
- (S548)Restrictions on use other than the primary purpose (lifting work)
- (S549)Restrictions on use other than the primary purpose (lifting work)
- (S550)Restrictions on use other than the primary purpose (lifting work)
- (S551)Backhoe with crane function
- (S552)Backhoe with crane function
- (S553)Compaction machines (rollers)

Belt slings for lifting
Belt slings for lifting
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Compaction machines (rollers)

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(S559)Compaction machines (rollers)
(S560)Concrete Pump
(S561)Concrete Pump
(S562)Concrete Pump
(S563)Concrete Pump
(S564)Concrete Pump
(S565)Breakers
(S566)Breakers
(S567)Breakers
(S568)Loading and Unloading machinery
(S569)Loading and Unloading machinery
(S570)Loading and Unloading machinery
(S571)Loading and Unloading machinery
(S572)Loading and Unloading machinery
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(S580)Loading and Unloading machinery
(S581)Forklift
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Compaction machines (rollers)
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(S595)Dump Truck
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(S601)Road Traffic Act
(S602)Off-Road Vehicles
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(S616) Freight Vehicles
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(S619) Freight Vehicles
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(S621) Freight Vehicles

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(S626) Conveyor
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(S629) Conveyor
(S630) Conveyor
(S631) Conveyor
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(S634) Aerial work vehicles
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(S649) Aerial work vehicles
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(S651) Aerial work vehicles
(S652) Aerial work vehicles
(S653) Pile drivers, Pile extractors, and Boring machines
(S654) Pile drivers, Pile extractors, and Boring machines
(S655) Pile drivers, Pile extractors, and Boring machines

Freight Vehicles
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Aerial work vehicles
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Pile drivers, Pile extractors, and Boring machines
Pile drivers, Pile extractors, and Boring machines
Pile drivers, Pile extractors, and Boring machines

(S724) Track equipment
(S725) Track equipment
(S726) Track equipment
(S727) Track equipment
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(S729) Track equipment
(S730) Track equipment
(S731) Track equipment
(S732) Track equipment
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(S737) Track equipment
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(S740) Track equipment
(S741) Track equipment
(S742) Track equipment

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(S273)Accident type classification
(S274)Accident type classification
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(S276)Accident type classification
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(S288)Accident type classification
(S289)Accident type classification
(S290)Accident type classification
(S634) Aerial work vehicles
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(S386) Mobile crane management
(S387) Do not enter under a suspended load
(S388) Do not enter under a suspended load
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(S390) Do not enter under a suspended load
(S391) Do not enter under a suspended load
(S392) Do not enter under a suspended load
(S393) Do not enter under a suspended load
(S595) Dump Truck
(S596) Dump Truck
(S597) Dump Truck
(S598) Dump Truck
(S599) Dump Truck
(S600) Dump Truck
(S263) Education for new entrants
(S693) Electric Shock
(S694) Electric Shock
(S695) Electric Shock
(S696) Electric Shock
(S689) Inspection of electrical equipment, etc.
(S690) Inspection of electrical equipment, etc.
(S691) Inspection of electrical equipment, etc.
(S692) Inspection of electrical equipment, etc.
(S684) Electrical Machinery, Wiring, and Moving Electric Cables
(S685) Electrical Machinery, Wiring, and Moving Electric Cables
(S686) Electrical Machinery, Wiring, and Moving Electric Cables
(S687) Electrical Machinery, Wiring, and Moving Electric Cables
(S688) Electrical Machinery, Wiring, and Moving Electric Cables
(S403) Elevator safety work
(S404) Elevator safety work
(S405) Elevator safety work
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(S407) Elevator safety work
(S408) Elevator safety work

Do not enter under a suspended load
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Dump Truck
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Dump Truck
Education for new entrants
Electric Shock
Electric Shock
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Electric Shock
Electrical equipment, etc.
Electrical equipment, etc.
Electrical equipment, etc.
Electrical equipment, etc.
Electrical Machinery, Wiring, and Moving Electric Cables
Electrical Machinery, Wiring, and Moving Electric Cables
Electrical Machinery, Wiring, and Moving Electric Cables
Electrical Machinery, Wiring, and Moving Electric Cables
Electrical Machinery, Wiring, and Moving Electric Cables
Elevator safety work
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(S417)Elevator safety work
(S418)Elevator safety work
(S419)Elevator safety work
(S420)Elevator safety work
(S421)Elevator safety work
(S319)Flow of creating a work plan for construction machinery
(S320)Flow of creating a work plan for construction machinery
(S321)Flow of creating a work plan for construction machinery
(S322)Flow of creating a work plan for construction machinery
(S581)Forklift
(S582)Forklift
(S583)Forklift
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(S585)Forklift
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(S587)Forklift
(S588)Forklift
(S589)Forklift
(S590)Forklift
(S591)Forklift
(S592)Forklift
(S593)Forklift
(S594)Forklift
(S253)Foundation construction machinery
(S254)Foundation construction machinery
(S255)Foundation construction machinery

Elevator safety work
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Foundation construction machinery
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Foundation construction machinery

(S616) Freight Vehicles
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(S620) Freight Vehicles
(S621) Freight Vehicles
(S622) Freight Vehicles
(S623) Freight Vehicles
(S624) Freight Vehicles
(S625) Freight Vehicles
(S328) General standards for machinery
(S329) General standards for machinery
(S330) General standards for machinery
(S331) General standards for machinery
(S332) General standards for machinery
(S333) General standards for machinery
(S334) General standards for machinery
(S335) General standards for machinery
(S336) General standards for machinery
(S337) General standards for machinery
(S704) Generator
(S705) Generator
(S706) Generator
(S707) Generator
(S437) Gondola safety work
(S438) Gondola safety work
(S439) Gondola safety work
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(S445) Gondola safety work
(S446) Gondola safety work

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(S447)Gondola safety work
(S498)Guidelines for safety in slinging work
(S499)Guidelines for safety in slinging work
(S500)Guidelines for safety in slinging work
(S501)Guidelines for safety in slinging work
(S466)How to fix wire rope
(S467)How to fix wire rope
(S468)How to fix wire rope
(S469)How to fix wire rope
(S470)How to fix wire rope
(S471)How to fix wire rope
(S472)How to fix wire rope
(S473)How to fix wire rope
(S474)How to fix wire rope
(S394)How to use a mobile crane
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(S401)How to use a mobile crane
(S402)How to use a mobile crane
(S568)Loading and Unloading machinery
(S569)Loading and Unloading machinery
(S570)Loading and Unloading machinery
(S571)Loading and Unloading machinery
(S572)Loading and Unloading machinery
(S573)Loading and Unloading machinery
(S574)Loading and Unloading machinery
(S575)Loading and Unloading machinery
(S576)Loading and Unloading machinery
(S577)Loading and Unloading machinery
(S578)Loading and Unloading machinery

[illegible]

(S579)Loading and Unloading machinery
(S580)Loading and Unloading machinery
(S250)Machinery tip over
(S486)Management of slinging equipment
(S487)Management of slinging equipment
(S488)Management of slinging equipment
(S489)Management of slinging equipment
(S490)Management of slinging equipment
(S491)Management of slinging equipment
(S492)Management of slinging equipment
(S492)Management of slinging equipment
(S375)Mobile crane management
(S376)Mobile crane management
(S377)Mobile crane management
(S378)Mobile crane management
(S379)Mobile crane management
(S380)Mobile crane management
(S381)Mobile crane management
(S382)Mobile crane management
(S383)Mobile crane management
(S384)Mobile crane management
(S385)Mobile crane management
(S362)Mobile crane safety operations
(S363)Mobile crane safety operations
(S364)Mobile crane safety operations
(S365)Mobile crane safety operations
(S366)Mobile crane safety operations
(S367)Mobile crane safety operations
(S368)Mobile crane safety operations
(S369)Mobile crane safety operations
(S370)Mobile crane safety operations
(S371)Mobile crane safety operations
(S372)Mobile crane safety operations
(S373)Mobile crane safety operations

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(S374) Mobile crane safety operations
(S256) Mobile cranes
(S257) Mobile cranes
(S602) Off-Road Vehicles
(S603) Off-Road Vehicles
(S604) Off-Road Vehicles
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(S606) Off-Road Vehicles
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(S611) Off-Road Vehicles
(S612) Off-Road Vehicles
(S613) Off-Road Vehicles
(S614) Off-Road Vehicles
(S615) Off-Road Vehicles
(S248) Open work
(S697) Overhead Power Lines
(S698) Overhead Power Lines
(S699) Overhead Power Lines
(S700) Overhead Power Lines
(S701) Overhead Power Lines
(S702) Overhead Power Lines
(S703) Overhead Power Lines
(S454) Overview of wire rope
(S455) Overview of wire rope
(S456) Overview of wire rope
(S457) Overview of wire rope
(S458) Overview of wire rope
(S459) Overview of wire rope
(S460) Overview of wire rope
(S461) Overview of wire rope
(S462) Overview of wire rope

[illegible]

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(S550)Restrictions on use other than the primary purpose (lifting work)

(S601)Road Traffic Act

(S528)Safe operation-construction machinery

(S529)Safe operation-construction machinery

(S530)Safe operation-construction machinery

(S531)Safe operation-construction machinery

(S532)Safe operation-construction machinery

(S533)Safe operation-construction machinery

(S534)Safe operation-construction machinery

(S535)Safe operation-construction machinery

(S536)Safe operation-construction machinery

(S537)Safe operation-construction machinery

(S538)Safe operation-construction machinery

(S539)Safe operation-construction machinery

(S540)Safe operation-construction machinery

(S541)Safe operation-construction machinery

(S542)Safe operation-construction machinery

(S543)Safe operation-construction machinery

(S544)Safe operation-construction machinery

(S545)Safe operation-construction machinery

(S546)Safe operation-construction machinery

(S547)Safe operation-construction machinery

(S422)Safe operation of construction lifts

(S423)Safe operation of construction lifts

(S424)Safe operation of construction lifts

(S425)Safe operation of construction lifts

(S426)Safe operation of construction lifts

(S427)Safe operation of construction lifts

(S428)Safe operation of construction lifts

(S429)Safe operation of construction lifts

(S430)Safe operation of construction lifts

(S431)Safe operation of construction lifts

(S432)Safe operation of construction lifts

(S433)Safe operation of construction lifts

Restrictions (lifting work)

Road Traffic Act

Safe operation

Safe operation

Safe operation

Safe operation

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Safe operation of construction lifts

(S434)Safe operation of construction lifts
(S435)Safe operation of construction lifts
(S436)Safe operation of construction lifts
(S448)Safe winch operation
(S449)Safe winch operation
(S450)Safe winch operation
(S451)Safe winch operation
(S452)Safe winch operation
(S453)Safe winch operation
(S291)Safety construction cycle
(S292)Safety construction cycle
(S293)Safety construction cycle
(S294)Safety construction cycle
(S295)Safety construction cycle
(S296)Safety construction cycle
(S297)Safety construction cycle
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(S308)Safety construction cycle
(S309)Safety construction cycle
(S310)Safety construction cycle
(S311)Safety construction cycle
(S312)Safety construction cycle
(S313)Safety construction cycle
(S493)Safety load of sling wire rope
(S494)Safety load of sling wire rope

Safe operation of construction lifts
Safe operation of construction lifts
Safe operation of construction lifts
Safe winch operation
Safe winch operation
Safe winch operation
Safe winch operation
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Safety construction cycle
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Safety load of sling wire rope
Safety load of sling wire rope

(S495)Safety load of sling wire rope
(S496)Safety load of sling wire rope
(S314)Safety measures for machinery
(S315)Safety measures for machinery
(S316)Safety measures for machinery
(S317)Safety measures for machinery
(S318)Safety measures for machinery
(S258)Signals
(S259)Signs
(S509)Slinging method
(S510)Slinging method
(S511)Slinging method
(S512)Slinging method
(S513)Slinging method
(S514)Slinging method
(S515)Slinging method
(S516)Slinging method
(S517)Slinging method
(S502)Slinging procedure
(S503)Slinging procedure
(S504)Slinging procedure
(S505)Slinging procedure
(S506)Slinging procedure
(S507)Slinging procedure
(S508)Slinging procedure
(S323) Specific work (mobile crane work, etc.)
(S324) Specific work (mobile crane work, etc.)
(S325) Specific work (mobile crane work, etc.)
(S326) Specific work (mobile crane work, etc.)
(S327) Specific work (mobile crane work, etc.)
(S261)Standardization of alarms
(S262)Standardization of evacuation training
(S260)Standardization of storage locations
(S708) Track equipment

Safety load of sling wire rope
Safety load of sling wire rope
Safety measures for machinery
Safety measures for machinery
Safety measures for machinery
Safety measures for machinery
Safety measures for machinery
Signals
Signs
Slinging method
Slinging method
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Slinging method
Slinging procedure
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Slinging procedure
Specific work (mobile crane work, etc.)
Specific work (mobile crane work, etc.)
Specific work (mobile crane work, etc.)
Specific work (mobile crane work, etc.)
Specific work (mobile crane work, etc.)
Standardization of alarms
Standardization of evacuation training
Standardization of storage locations
Track equipment

(S475)Wire rope for lifting

(S476)Wire rope for lifting

(S477)Wire rope for lifting

(S478)Wire rope for lifting

(S479)Wire rope for lifting

(S480)Wire rope for lifting

(S481)Wire rope for lifting

(S482)Wire rope for lifting

(S483)Wire rope for lifting

(S484)Wire rope for lifting

(S485)Wire rope for lifting

(S676) Wood processing machines

(S677) Wood processing machines

(S678) Wood processing machines

(S679) Wood processing machines

(S680) Wood processing machines

(S681) Wood processing machines

(S682) Wood processing machines

(S683) Wood processing machines

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wire rope for lifting

Wood processing machines

Wood processing machines

Wood processing machines

Wood processing machines

Wood processing machines

Wood processing machines

Wood processing machines

Wood processing machines

(S248) Open work

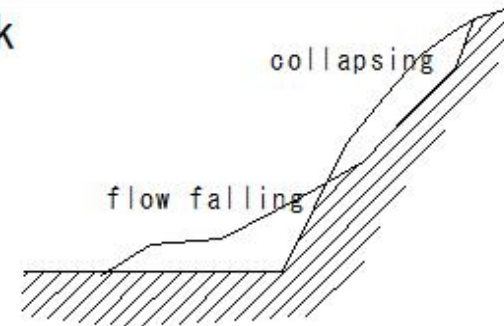
(S248) Open work

In case of there is a risk of soil collapse

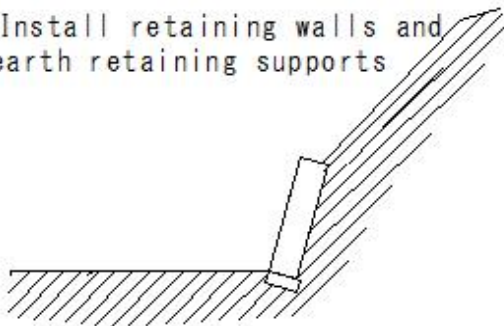
Open work

- In case of there is a risk of the ground collapsing
- In case of there is a risk of a debris flow falling

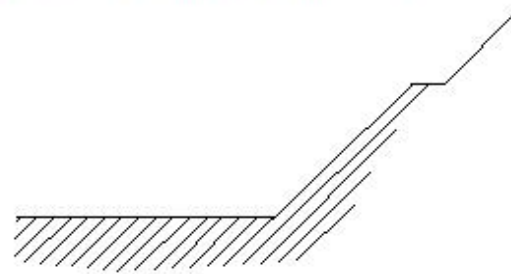
Countermeasures



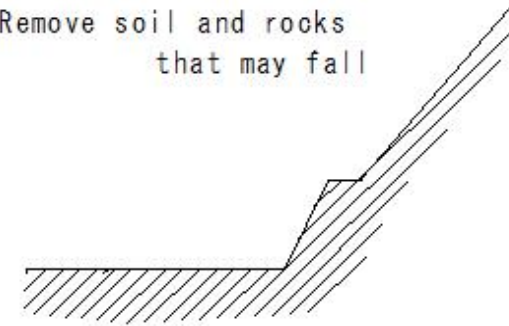
① Install retaining walls and earth retaining supports



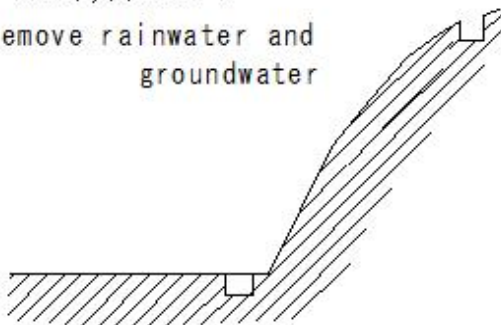
② Make the ground slope safe



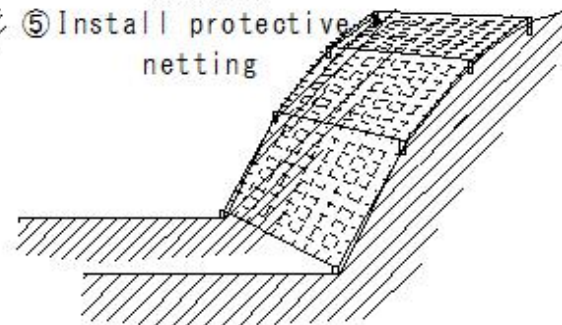
③ Remove soil and rocks that may fall



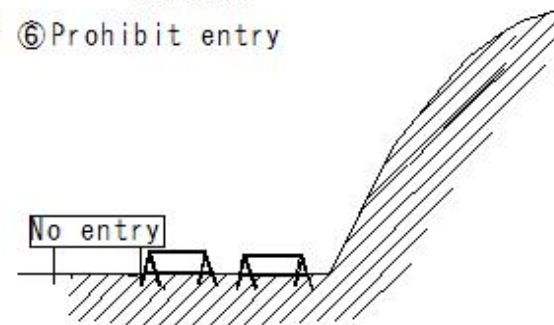
④ Remove rainwater and groundwater



⑤ Install protective netting



⑥ Prohibit entry



(S249)Debris flows

(S249)Debris flows

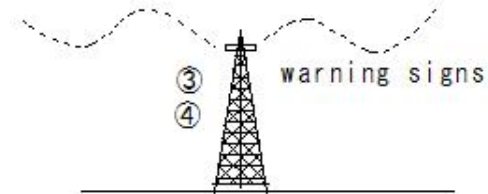
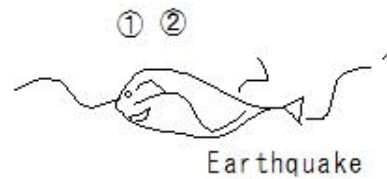
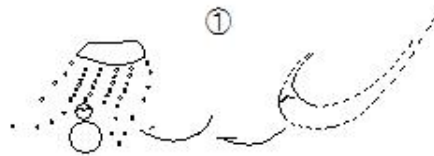
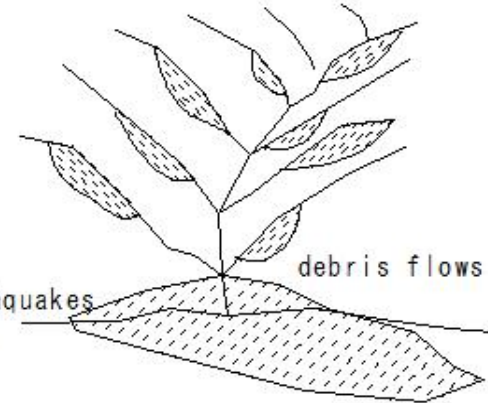
In case of there is a risk of landslides

Open work

Areas where debris flows may occur

Countermeasures

- ① catch rainfall
- ② Measures to be taken in the event of rainfall, snowmelt, or earthquakes
- ③ Measures to be taken if there are warning signs of a debris flow
- ④ Warnings and evacuation methods in the event of a debris flow
- ⑤ Contents and timing of evacuation drills



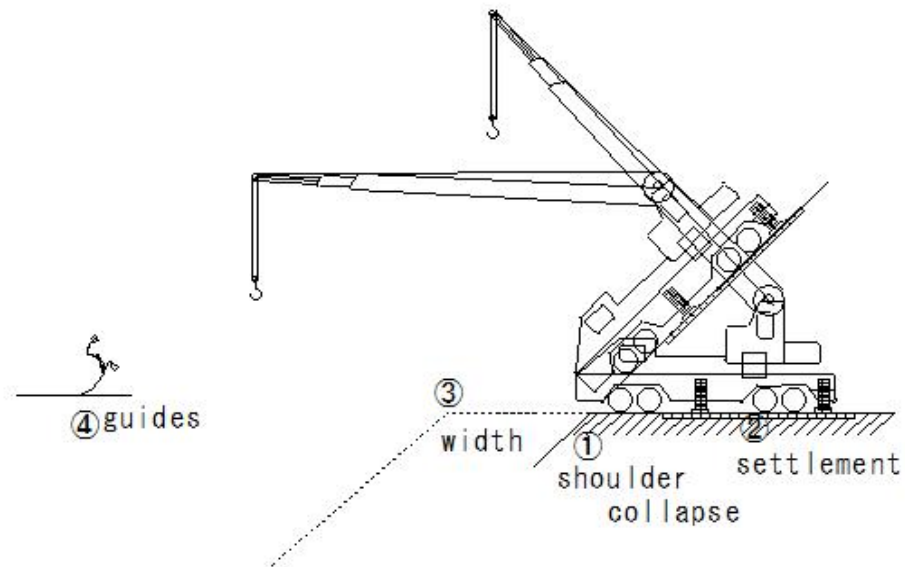
(S250)Machinery tip over

(S250)Machinery tip over

- Places where machinery may tip over

Measures

- ①Prevention of road shoulder collapse
- ②Prevention of uneven ground settlement
- ③Maintaining the necessary width
- ④Deployment of guides



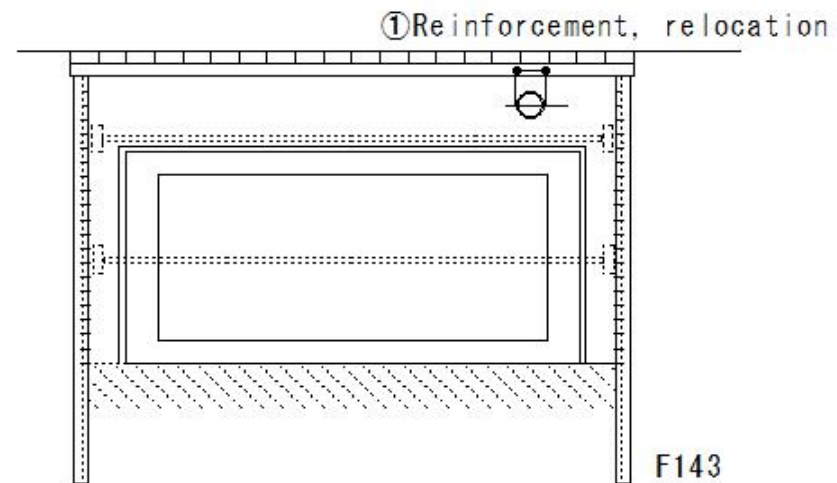
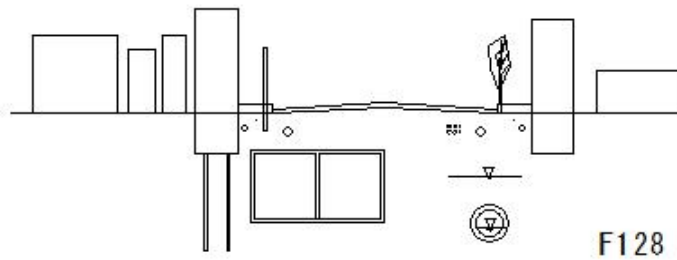
(S251) Danger of collapsing

(S251) Danger of collapsing

In case of buried objects, retaining walls, concrete block walls, brick walls, etc.
are in danger of collapsing

Measures

① Reinforcement, relocation



S186

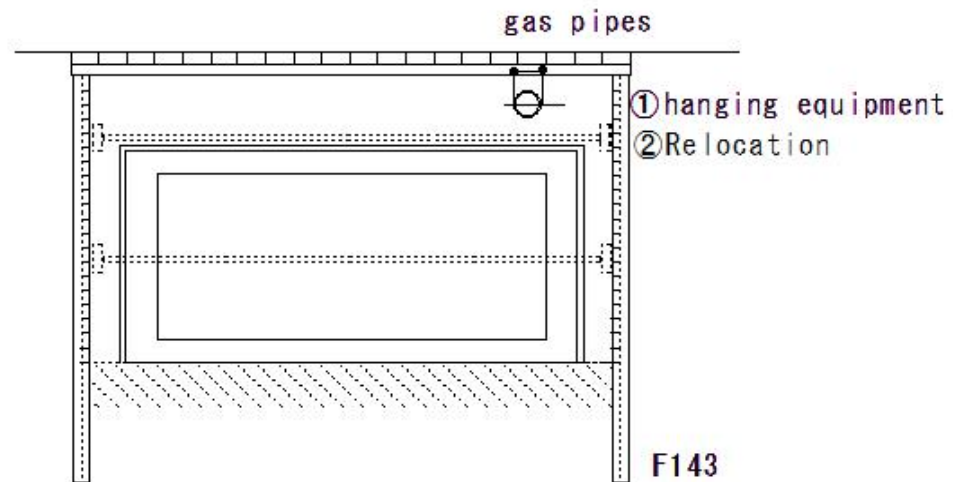
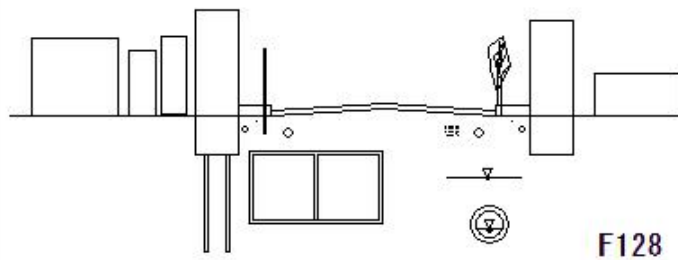
(S252) Danger of collapsing

(S252) Danger of collapsing

Places where exposed gas pipes may be damaged

Measures

- ① Protection (hanging equipment, receiving equipment)
- ② Relocation



S186

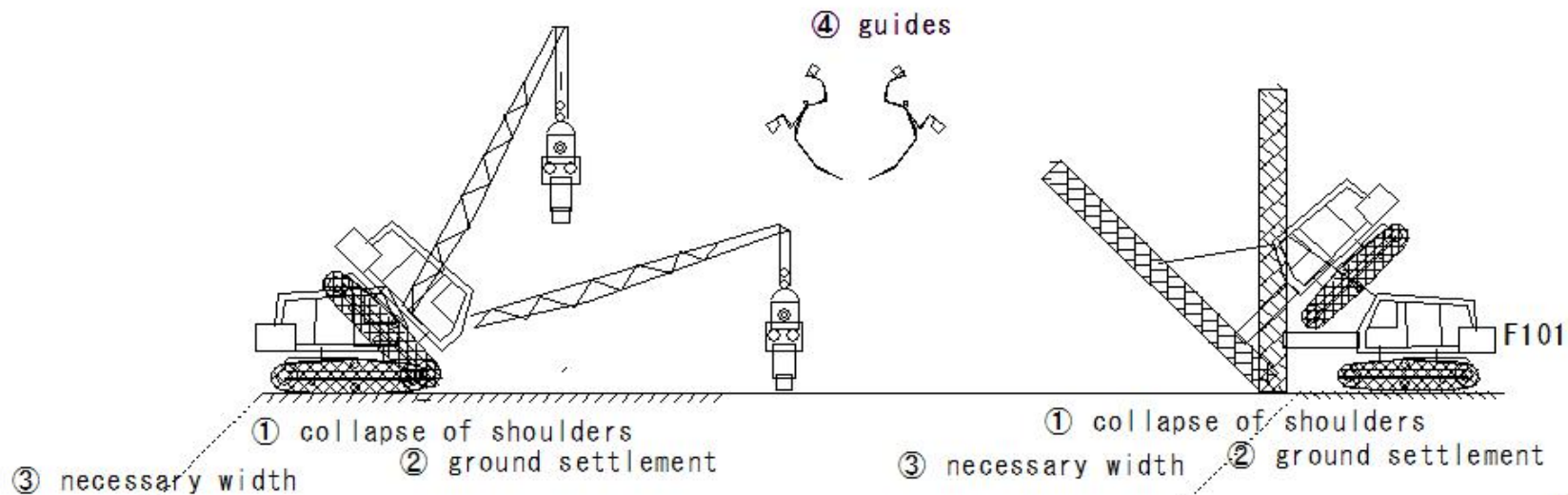
(S253) Foundation construction machinery

(S253) Foundation construction machinery

Places where foundation construction machinery (pile drivers and pile extractors) may tip over or fall
Road shoulders, slopes, soft ground

Countermeasures

- ① Prevent the collapse of road shoulders
- ② Prevent uneven ground settlement
- ③ Maintain the necessary width
- ④ Placement of guides



M67

(S254)Foundation construction machinery

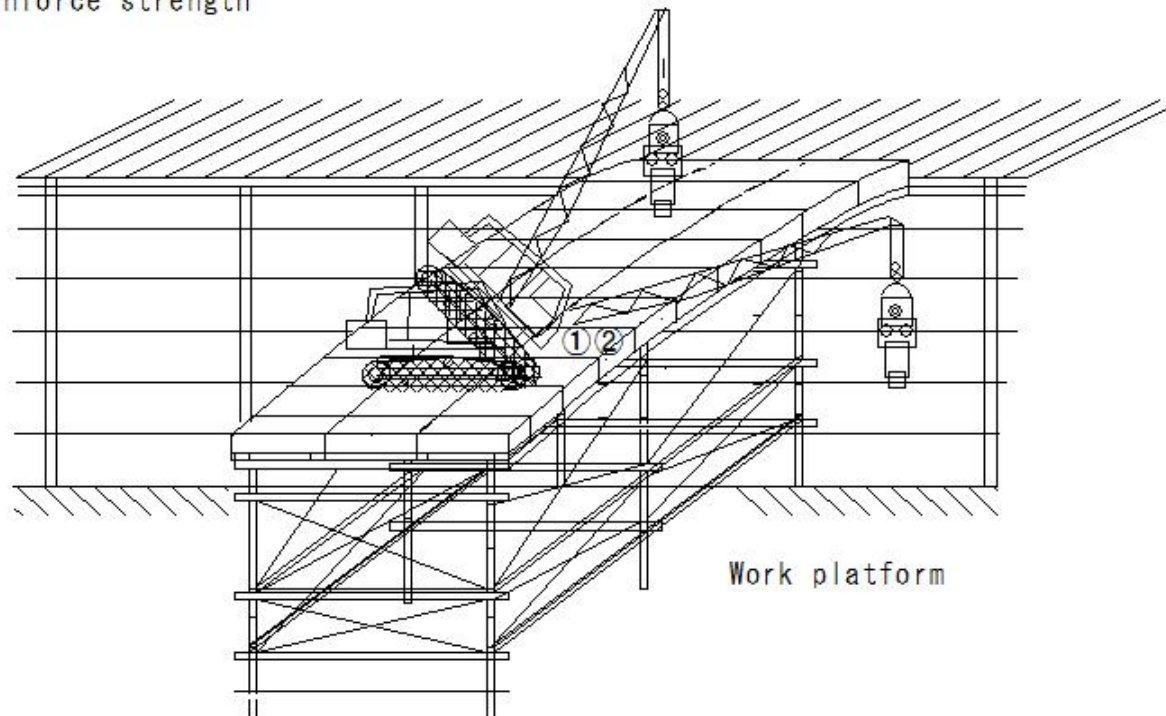
(S254)Foundation construction machinery

Places where foundation construction machinery (pile drivers and pile extractors) may tip over or fall

Piers, staging

Countermeasures

- ① Use floor boards and floor corners
- ② Check and reinforce strength



S48
M393

(S255)Foundation construction machinery

(S255)Foundation construction machinery

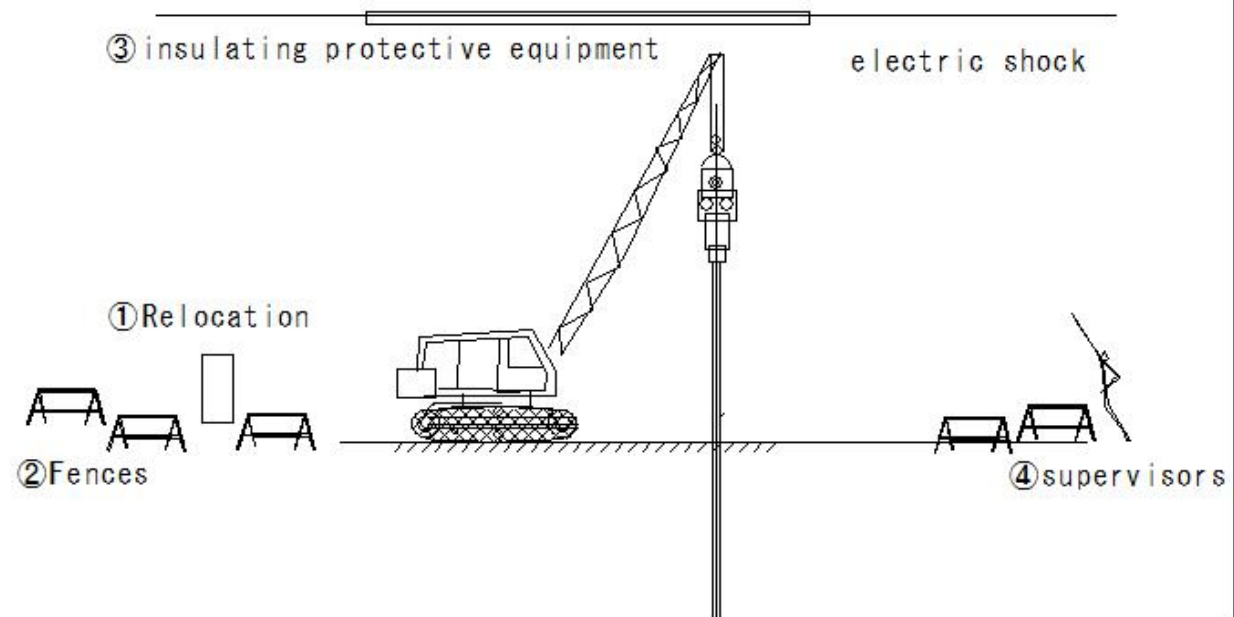
Places where foundation construction machinery (pile drivers and pile extractors) may tip over or fall

Places where there is a risk of electric shock

Places close to overhead power lines

Countermeasures

- ①Relocation of charging circuits
- ②Fences to prevent electric shock
- ③Installation of insulating protective equipment on charging circuits
- ④Posting of supervisors



(S256) Mobile cranes

(S256) Mobile cranes

Places where mobile cranes may tip over

Soft ground

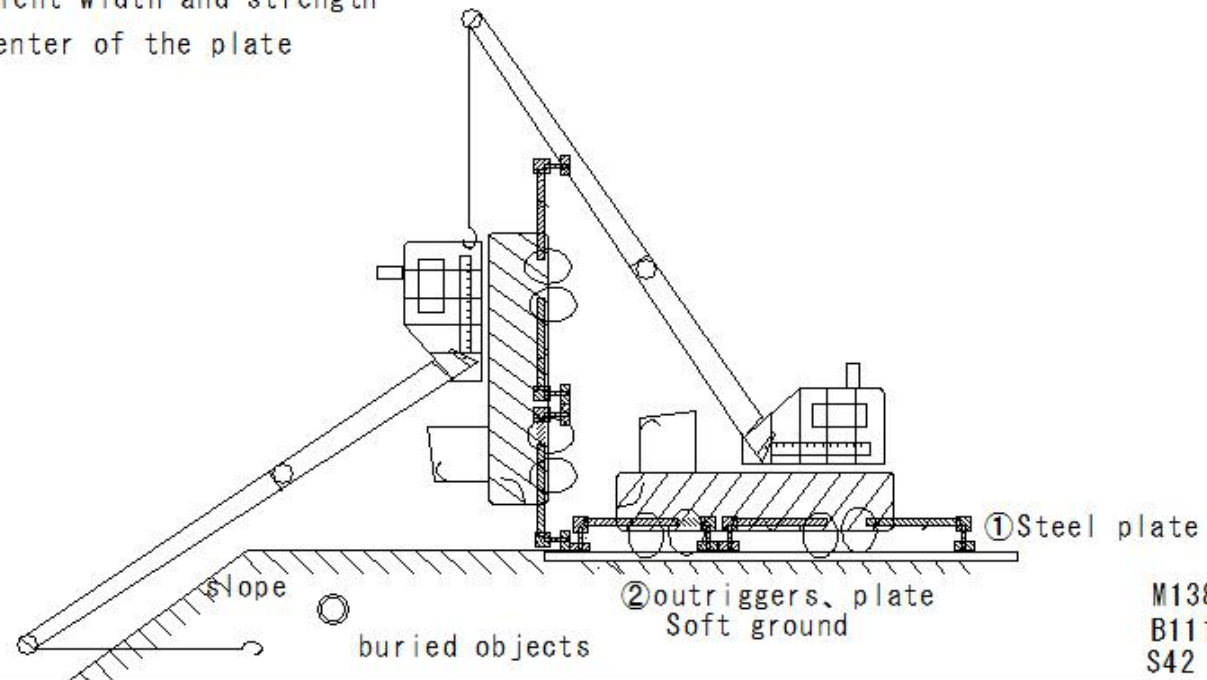
Collapse of slope

Damage to buried objects and underground structures

Countermeasures

① Steel plate with sufficient width and strength

② Use outriggers in the center of the plate



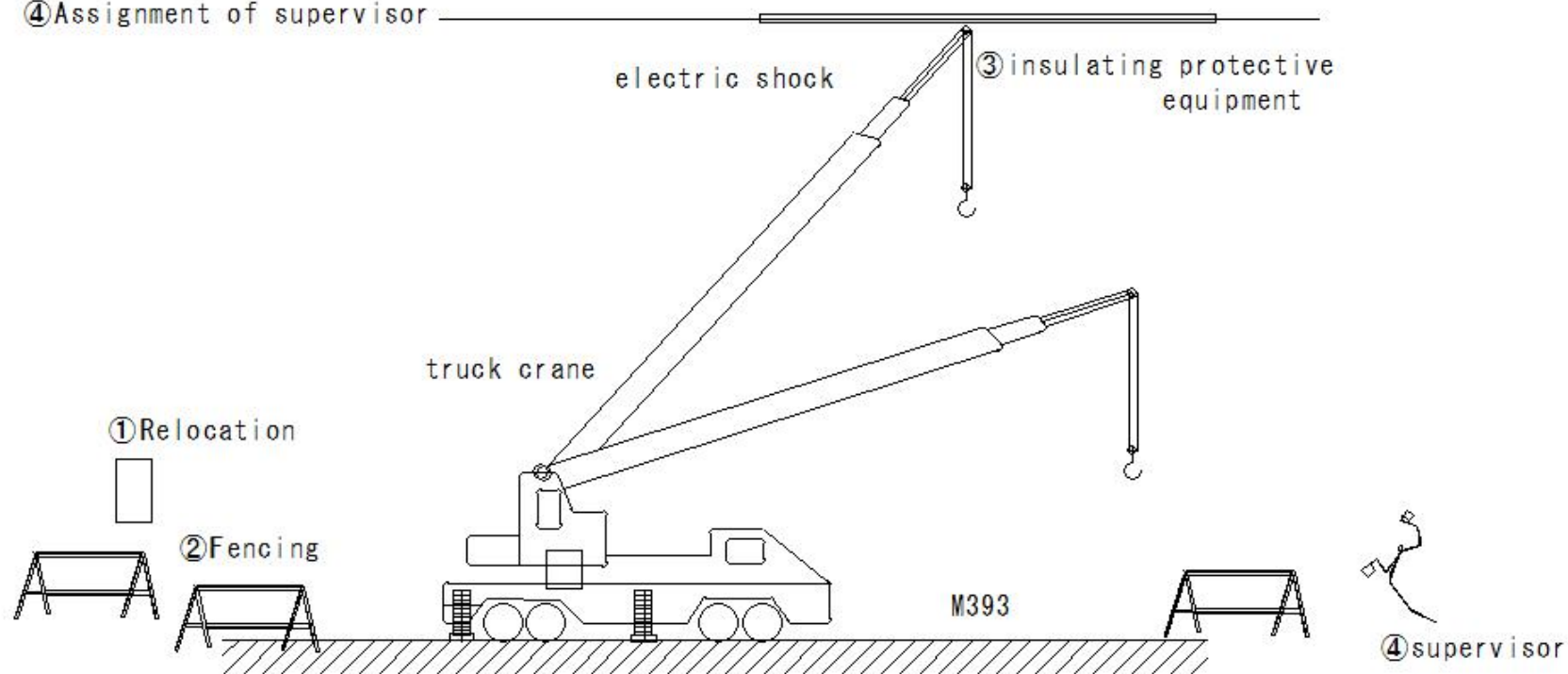
(S257) Mobile cranes

(S257) Mobile cranes

Locations where there is a risk of electric shock

Countermeasures

- ① Relocation of charging circuit
- ② Fencing to prevent electric shock
- ③ Installation of insulating protective equipment on charging circuit
- ④ Assignment of supervisor

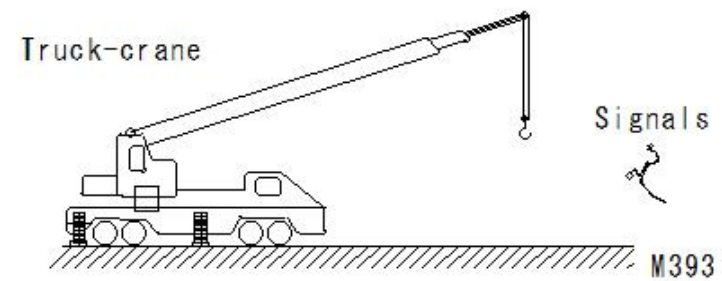
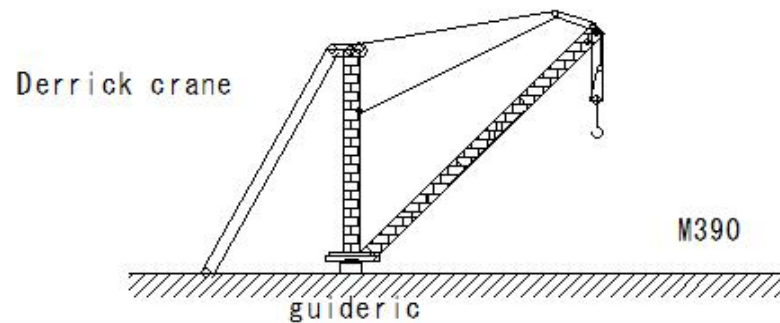
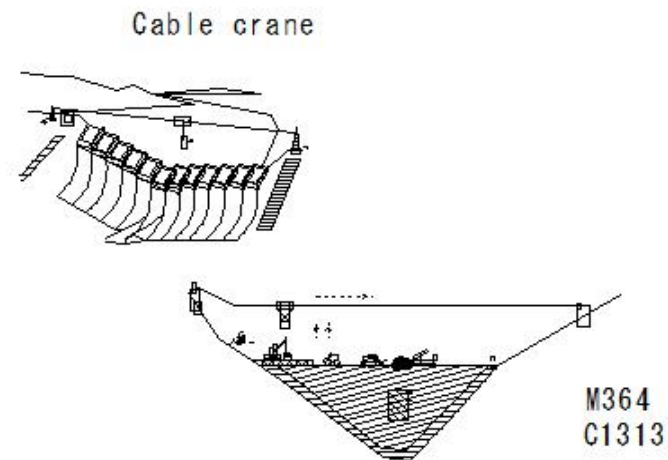
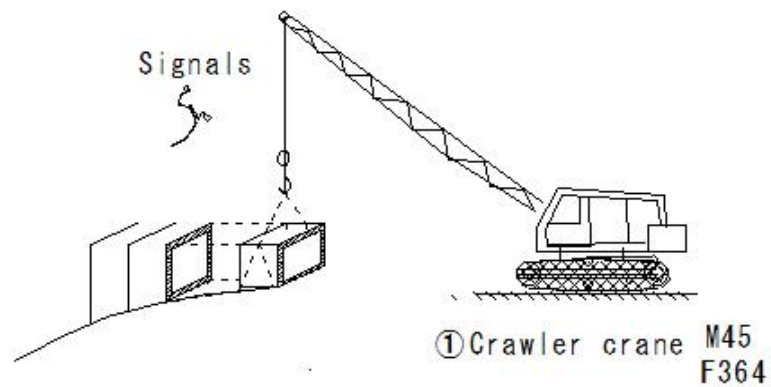


(S258)Signals

(S258) Signals

Standardization of signals for operating cranes, etc.

Cranes, mobile cranes, simple lifts, construction lifts



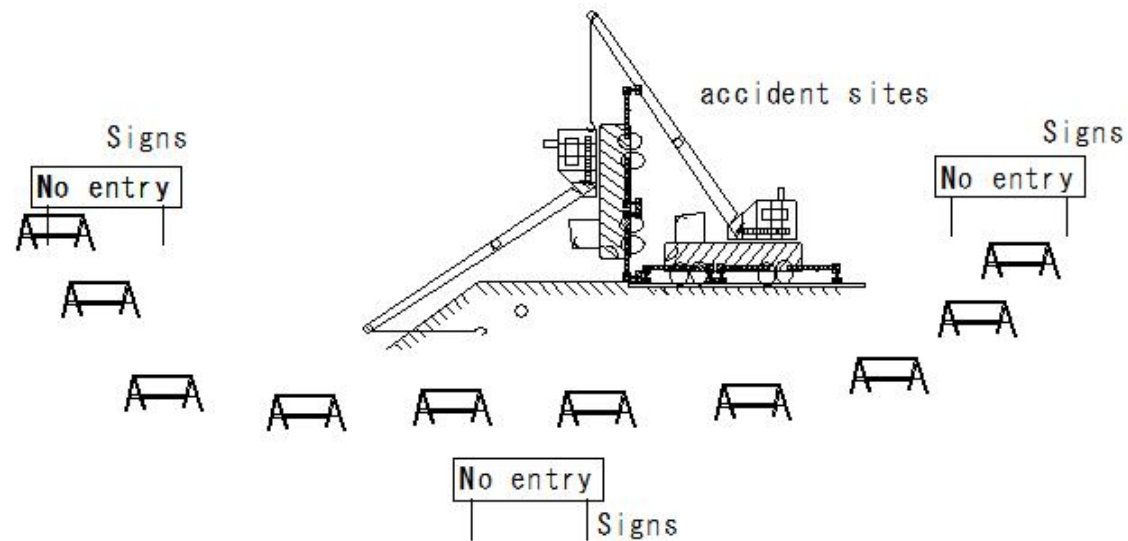
(S259)Signs

(S259) Signs

Standardization of signs at accident sites, etc.

Measures

No entry for non-related parties

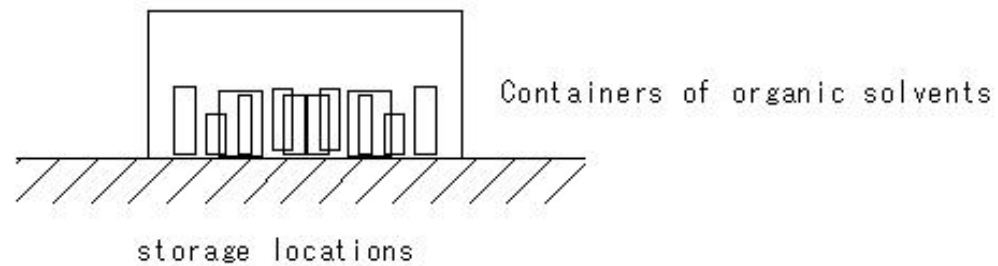


S256
S42
M138
B111

(S260)Standardization of storage locations

(S260)Standardization of storage locations

Standardization of storage locations for containers of organic solvents, etc.

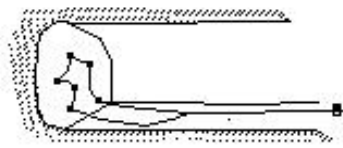


(S261)Standardization of alarms

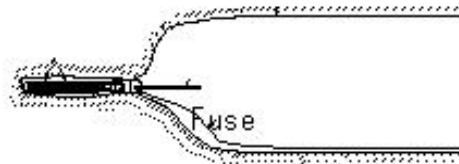
(S261)Standardization of alarms

Standardization of alarms

- Blasting, fire, landslide, flooding, avalanche occurrence

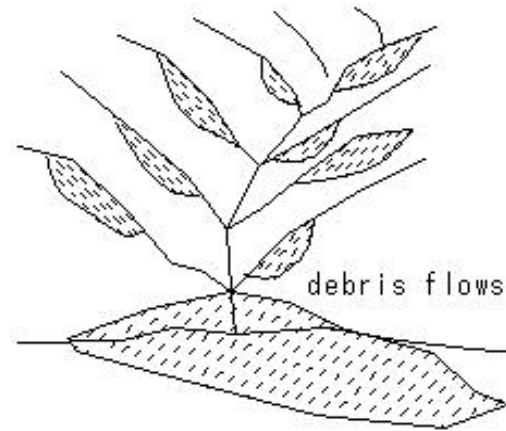


electric blasting

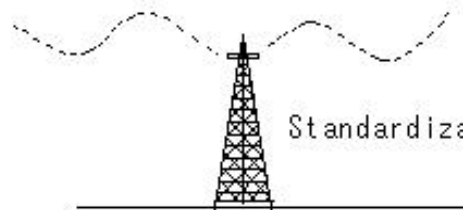


blasting the fuse

S140



S249



Standardization of alarms

(S262)Standardization of evacuation training

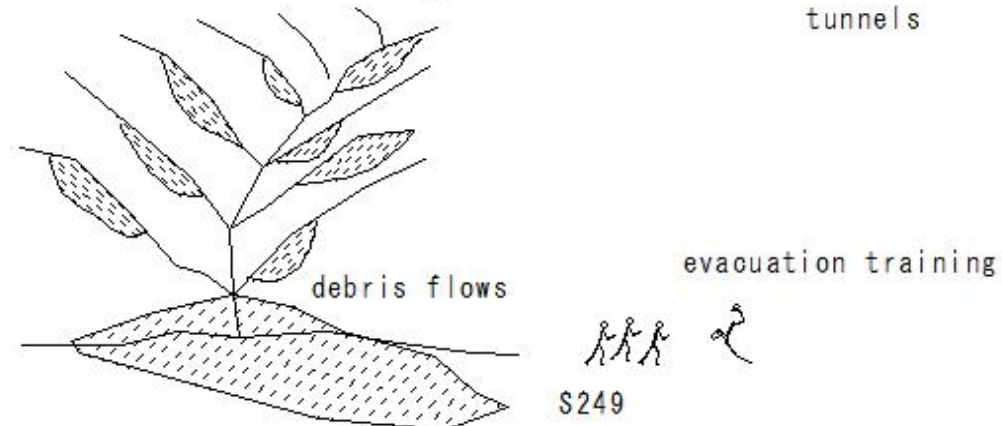
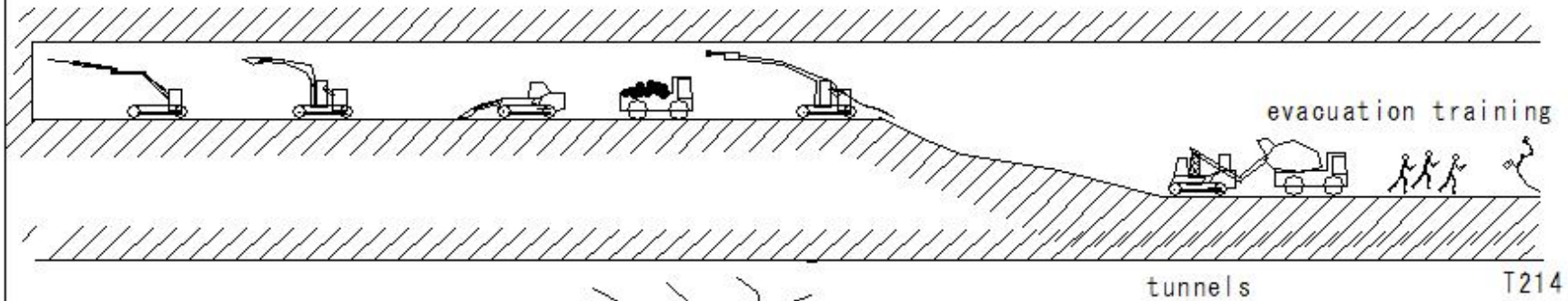
(S262) Standardization of evacuation training

Standardization of methods for conducting evacuation training, etc.

- Construction of tunnels, etc. that exceed the specified length

Conduoting evacuation Training

Evacuation training for rivers at risk of debris flow

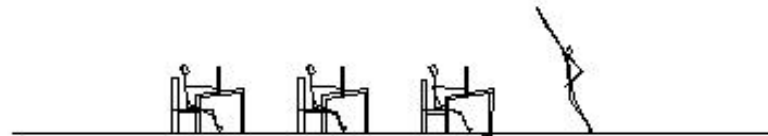


(S263)Education for new entrants

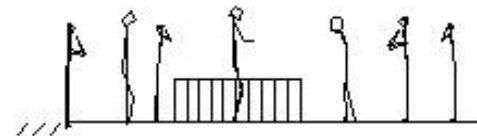
(S263)Education for new entrants

Providing materials for public awareness

Education for new entrants provided by partner companies



Education for new entrants



toolbox meeting

Inform

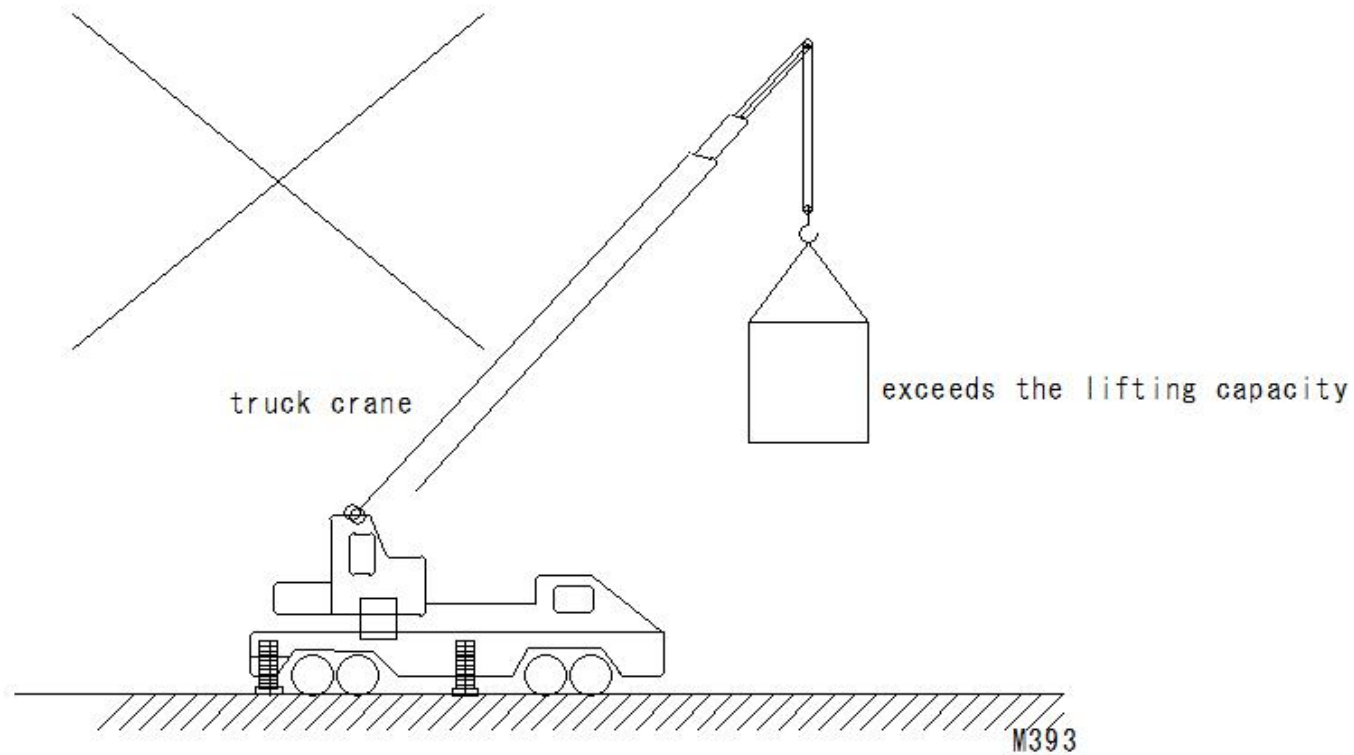
S209

(S264)Prohibition of illegal instructions

(S264)Prohibition of illegal instructions

Prohibition of illegal instructions

①Instructing a crane to lift a load that exceeds the lifting capacity

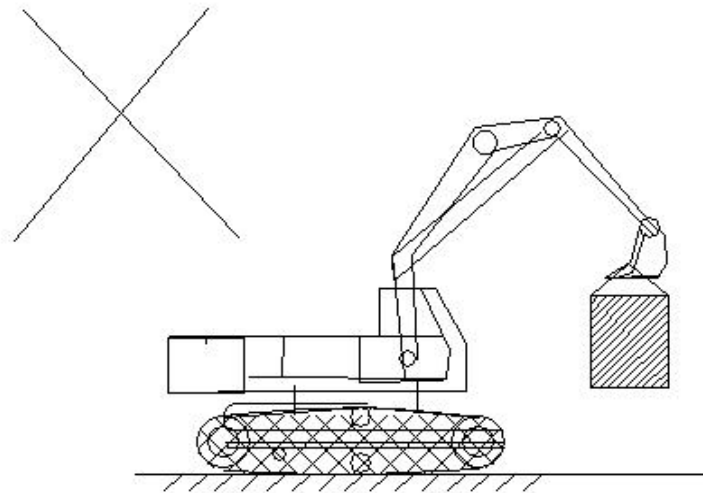


(S265)Prohibition of illegal instructions

(S265)Prohibition of illegal instructions

Prohibition of illegal instructions

②Instructing someone to do work other than the intended purpose of the construction machine



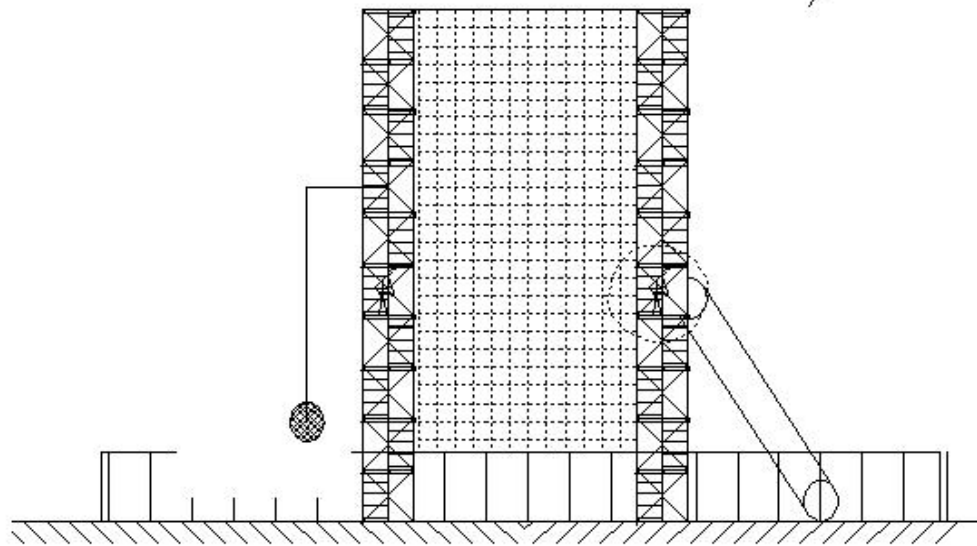
backhoe

(S266)Prohibition of illegal instructions

(S266)Prohibition of illegal instructions

Prohibition of illegal instructions

③ Instructing someone to work at height without taking fall protection measures



③ work at height



No safety harnesses

S153
S75

(S267)Causes of disasters

(S267)Causes of disasters

Causes of disasters

Causes of disasters

Human factors

Direct causes

- ① Defective work methods
- ② Incorrect operation
- ③ Unspecified use of machinery, etc.
- ④ Creating dangerous conditions
- ⑤ Approaching dangerous areas
- ⑥ Operational failure
- ⑦ Disabling safety devices
- ⑧ Leaving things in an unstable state
- ⑨ Defective protective equipment or clothing
- ⑩ Unsafe behavior
- ⑪ Failure to take safety measures
- ⑫ Cleaning, oiling, repairing, inspecting machinery and equipment while in operation

(S268) Causes of disasters

(S268) Causes of disasters

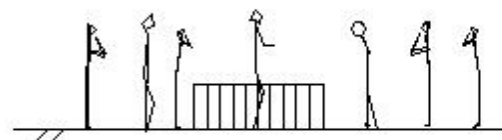
Causes of disasters

Physical factors

Indirect causes

- ① Unclear command and control authority
- ② Inadequate responsibility system
- ③ Inadequate advance evaluation when introducing machinery and equipment
- ④ Inadequate health and safety patrols
- ⑤ Inadequate construction and work plans
- ⑥ Inadequate work manuals
- ⑦ No work supervisor appointed, inadequate performance of duties
- ⑧ Inadequate communication, coordination, meetings, etc.

⑧ Inadequate communication



toolbox meeting

S209

S263

(S269)Causes of disasters

(S269)Causes of disasters

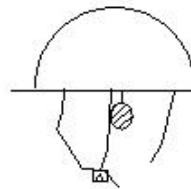
Causes of disasters

Physical factors

Direct causes

- ① Defects in the object itself
- ② Defects in the way objects are placed, in the work area
- ③ Defects in the work environment
- ④ Defects in protective measures
- ⑤ Defects in protective equipment, clothing, etc.
- ⑥ Unsafe conditions

⑤ Defects in protective equipment, clothing



S209

(S270)Response in the event of a disaster

(S270)Response in the event of a disaster

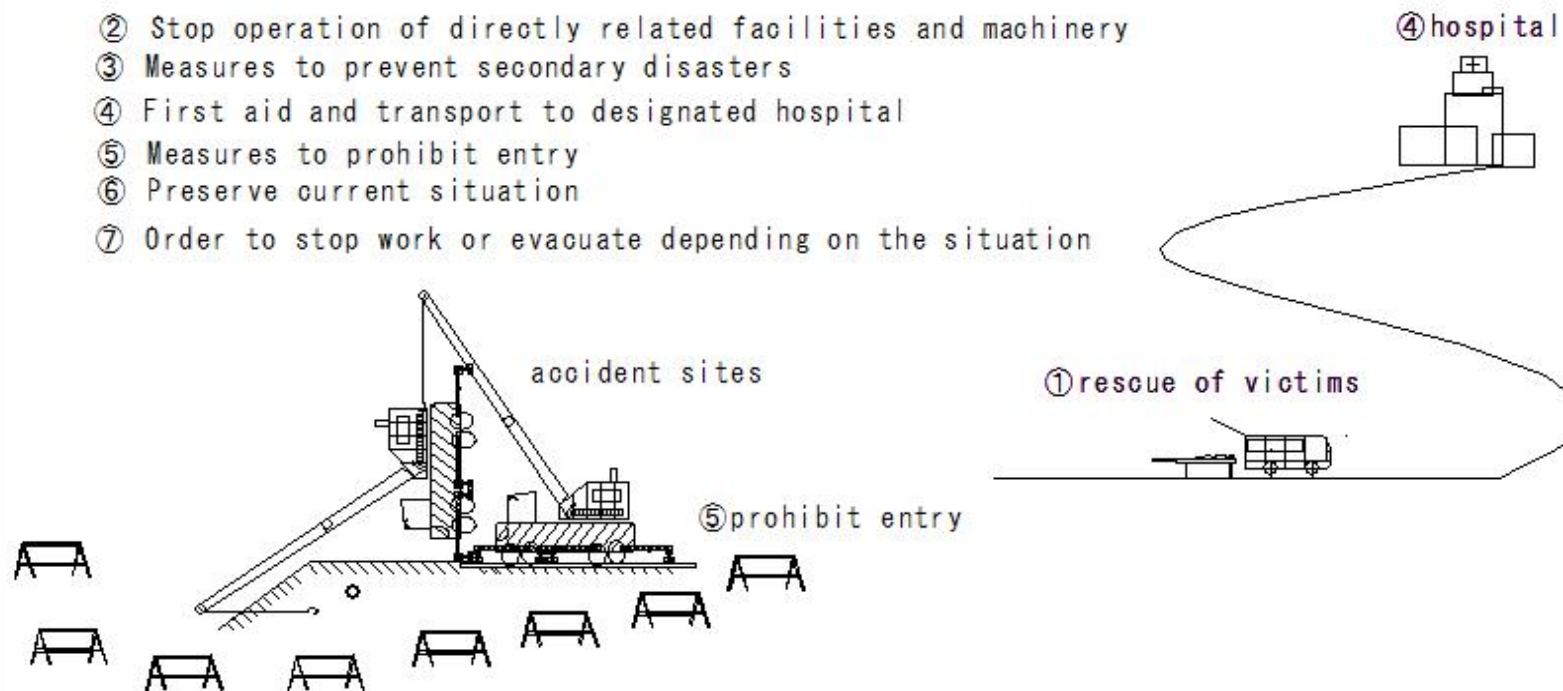
Response in the event of a disaster

On-site

Disaster occurrence

Emergency response

- ① Prioritize rescue of victims
- ② Stop operation of directly related facilities and machinery
- ③ Measures to prevent secondary disasters
- ④ First aid and transport to designated hospital
- ⑤ Measures to prohibit entry
- ⑥ Preserve current situation
- ⑦ Order to stop work or evacuate depending on the situation



(S271)Response in the event of a disaster

(S271)Response in the event of a disaster

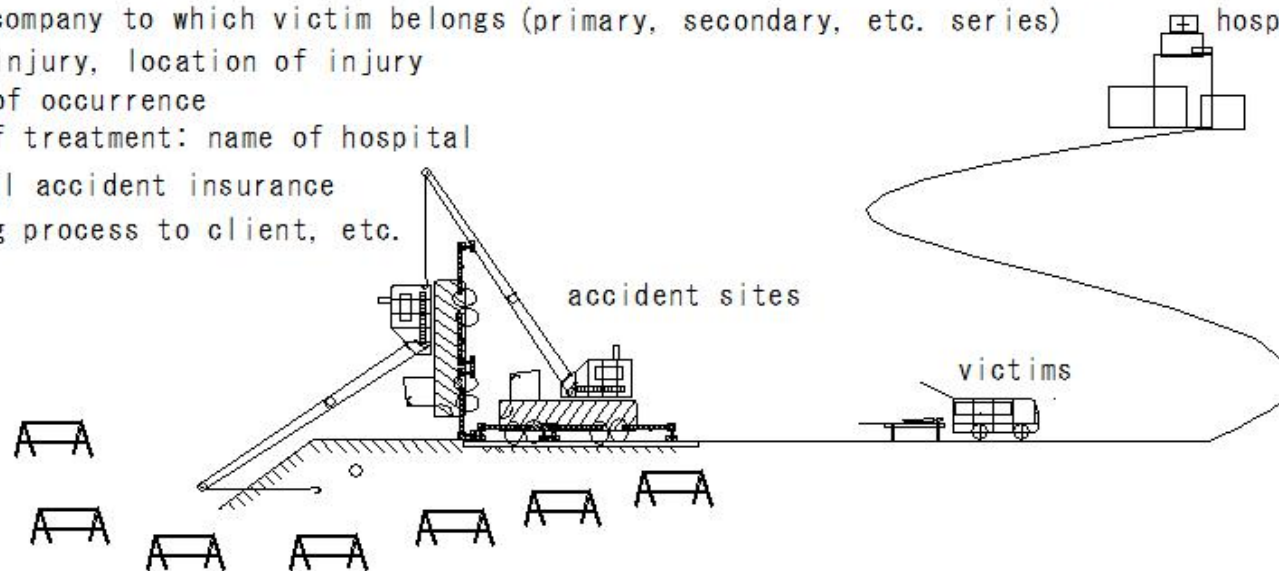
Response in the event of a disaster

On-site → Report

Safety department

Disaster report

- ① Date and time of occurrence
- ② Name of client, name of project, name of site
- ③ Name of victim, age, sex, occupation, number of days since admission, years of experience
- ④ Name of company to which victim belongs (primary, secondary, etc. series)
- ⑤ Name of injury, location of injury
- ⑥ Summary of occurrence
- ⑦ Method of treatment: name of hospital
- ⑧ Industrial accident insurance
- ⑨ Reporting process to client, etc.



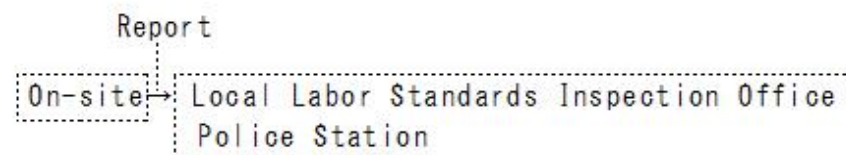
(S272)Response in the event of a disaster

(S272)Response in the event of a disaster

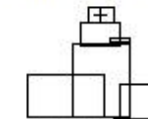
Response in the event of a disaster

On-site → Report → Local Labor Standards Inspection Office/Police Station

- ① Identification of the victim
- ② Status of medical examination
- ③ Employment status
- ④ Worker list
- ⑤ Work procedure manual
- ⑥ Safety and health management system and slippage status
- ⑦ Record of coordination between tasks
- ⑧ Record of checks for new entrants
- ⑨ Record of site patrol
- ⑩ Inspection list for equipment, machinery, etc.
- ⑪ Copies of notification documents submitted to government agencies

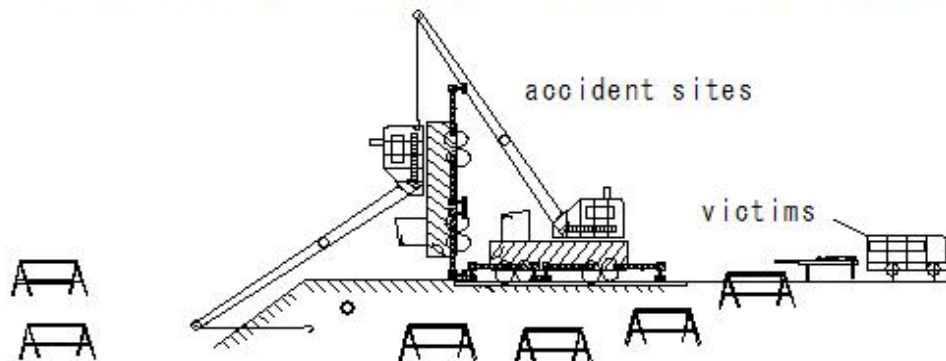


hospital



accident sites

victims



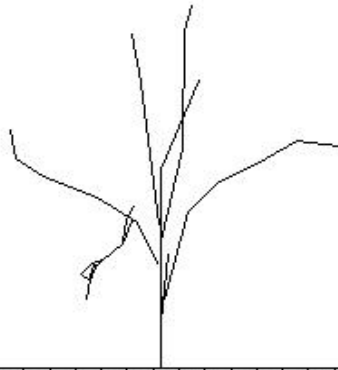
(S273)Accident type classification

(S273)Accident type classification

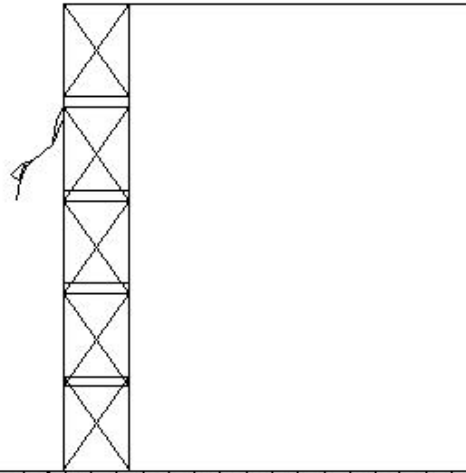
Accident type classification

01 Falling, falling: falling from a tree, scaffolding, ladder, or slope

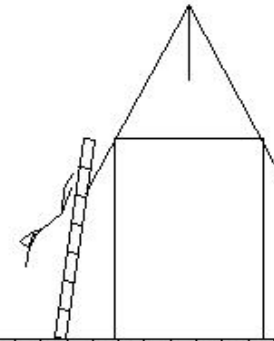
falling from a tree



falling from a scaffolding



falling from a ladder

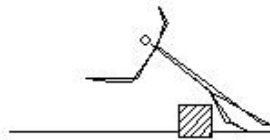


(S274)Accident type classification

(S274)Accident type classification

02 Toppling: falling due to tripping or slipping

tripping



slipping

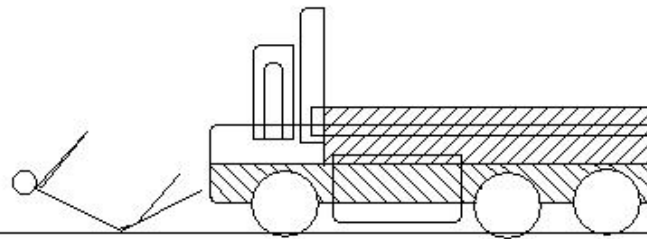


(S275)Accident type classification

(S275)Accident type classification

03 Collision: colliding with a vehicle-type construction machine, etc.

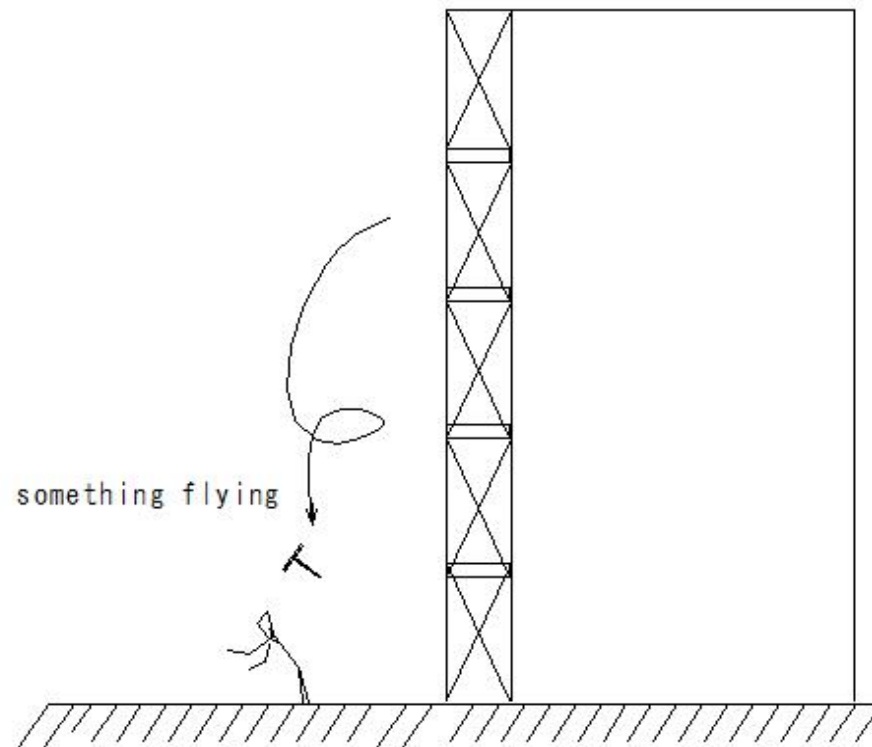
Collision



(S276)Accident type classification

(S276)Accident type classification

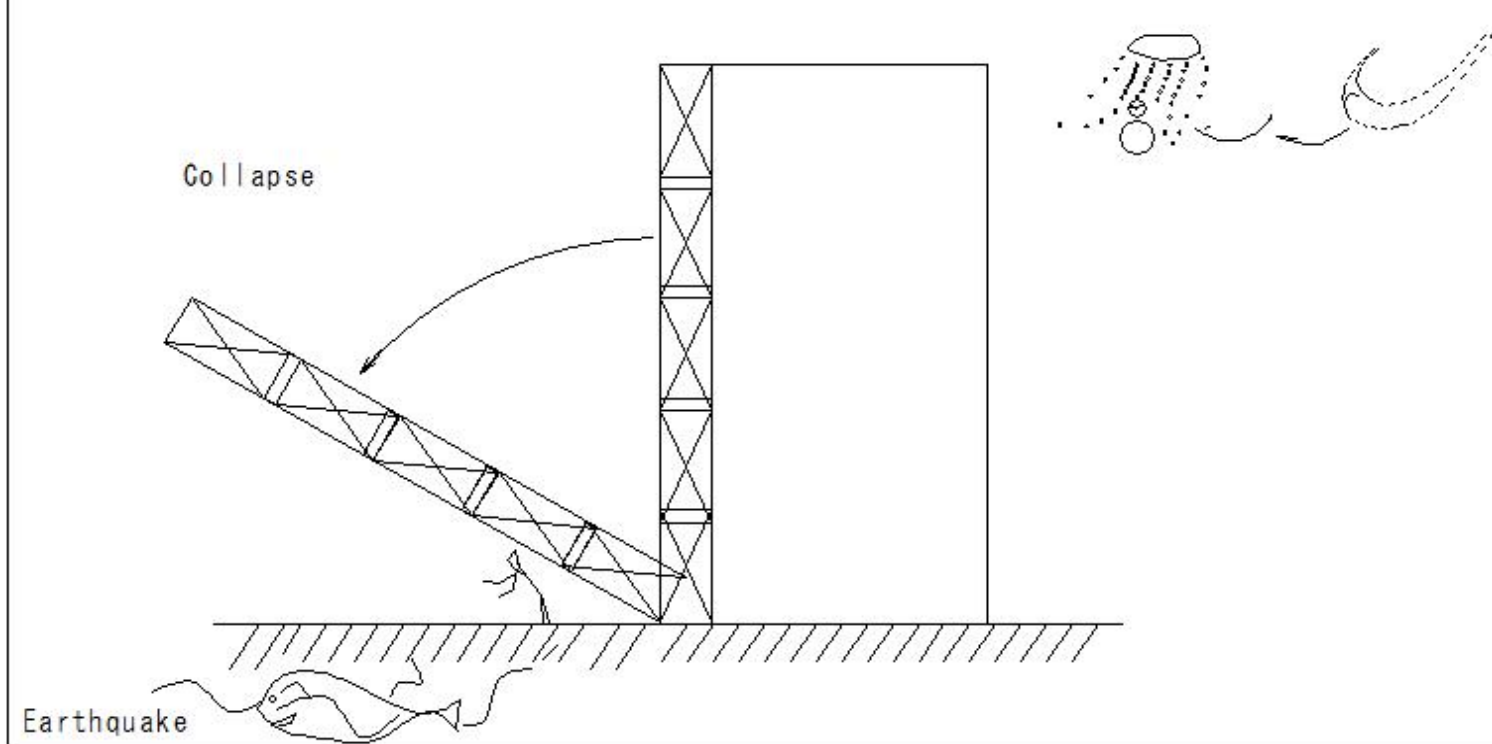
04 Flying, falling: something flying or falling



(S277)Accident type classification

(S277)Accident type classification

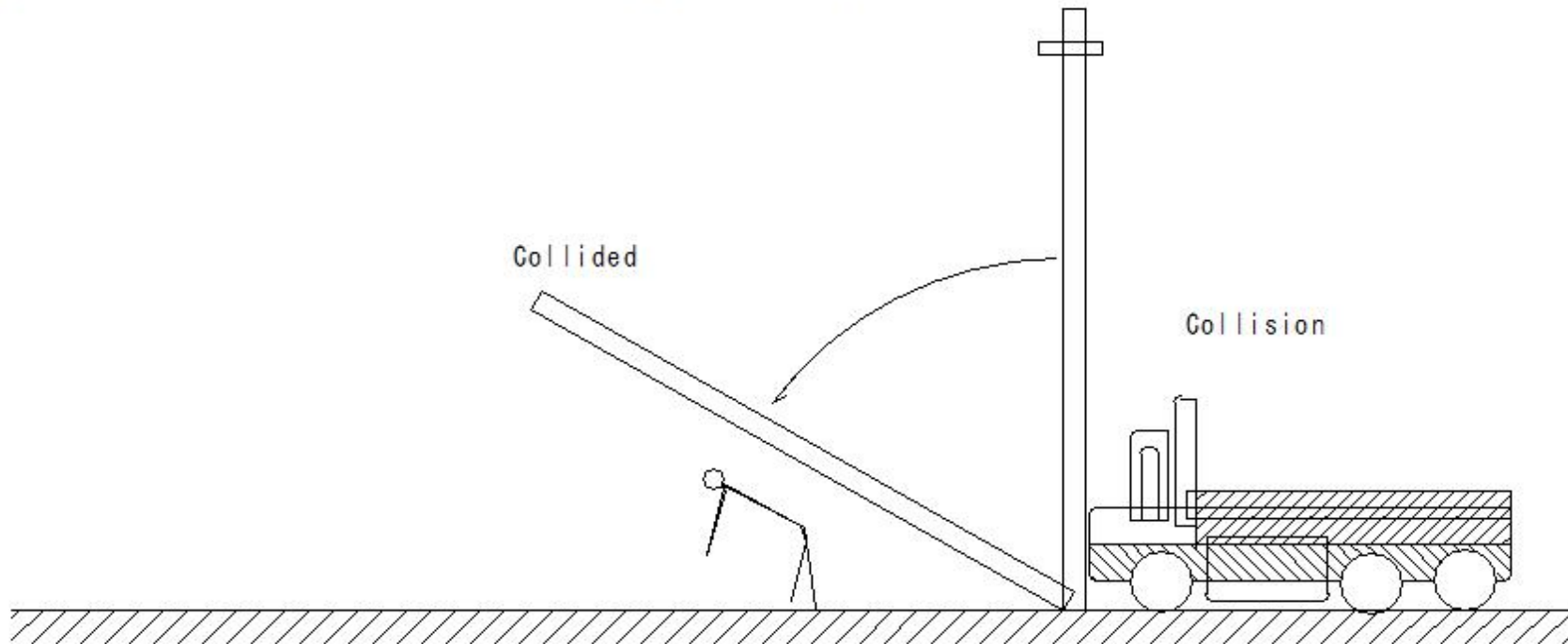
05 Collapse, collapse: piled-up objects, scaffolding, buildings, etc. collapsing



(S278)Accident type classification

(S278)Accident type classification

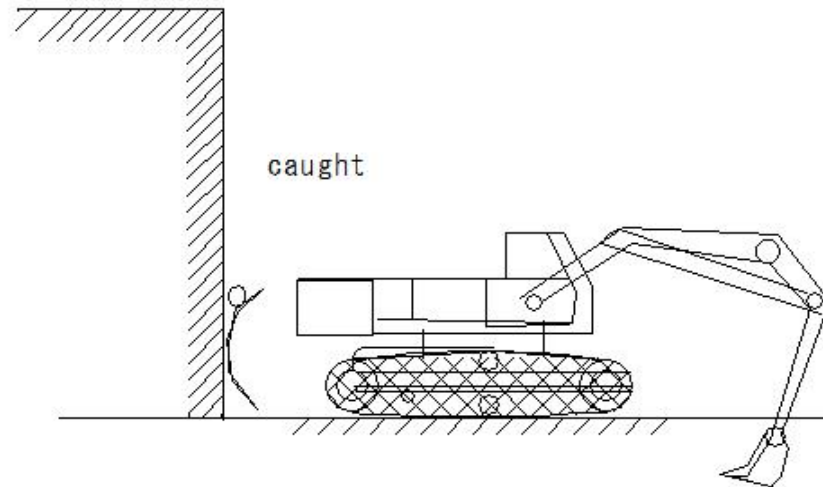
06 Collided: when an object is the main body and hits a person



(S279)Accident type classification

(S279)Accident type classification

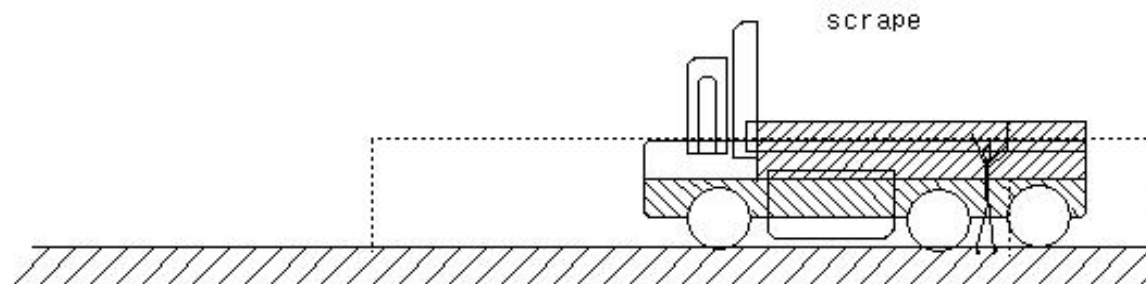
07 Being caught, caught in: being caught between objects



(S280)Accident type classification

(S280)Accident type classification

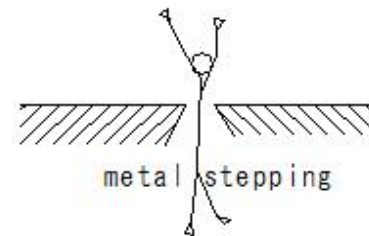
08 Cut, scrape: when being scraped



(S281)Accident type classification

(S281)Accident type classification

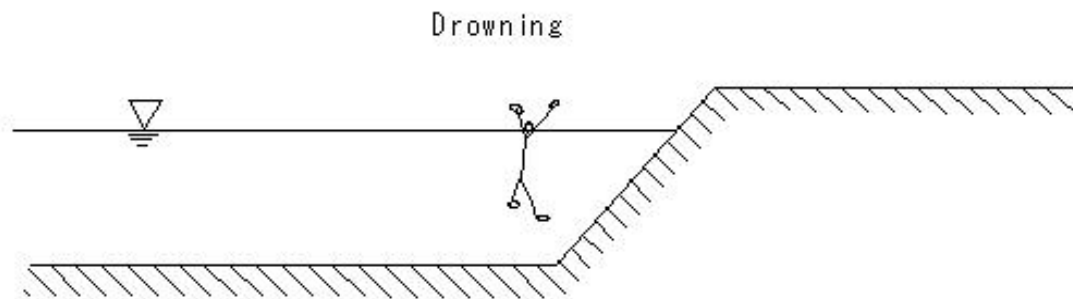
09 Stepping through: a nail, metal Stepping through metal pieces, stepping through floors, slate, etc.



(S282)Accident type classification

(S282)Accident type classification

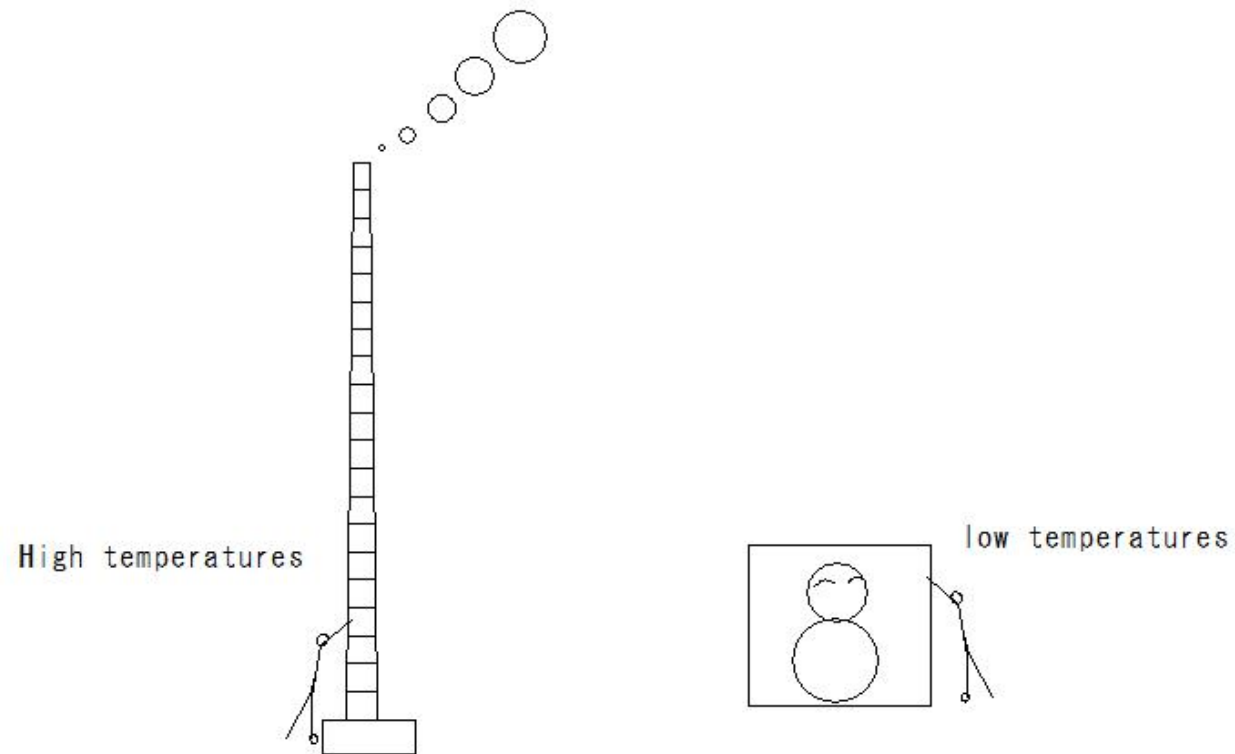
10 Drowning: Falling into water and drowning



(S283)Accident type classification

(S283)Accident type classification

11 Contact with hot or cold objects: High temperatures, low temperatures

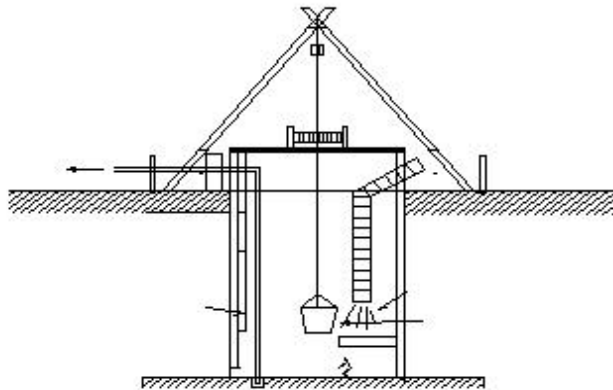


(S284)Accident type classification

(S284)Accident type classification

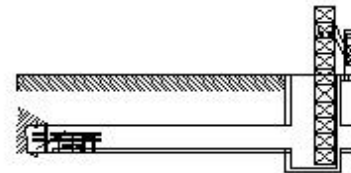
12 Contact with harmful objects: Radiation exposure, CO poisoning, oxygen deficiency

oxygen deficiency



F43
S36

oxygen deficiency



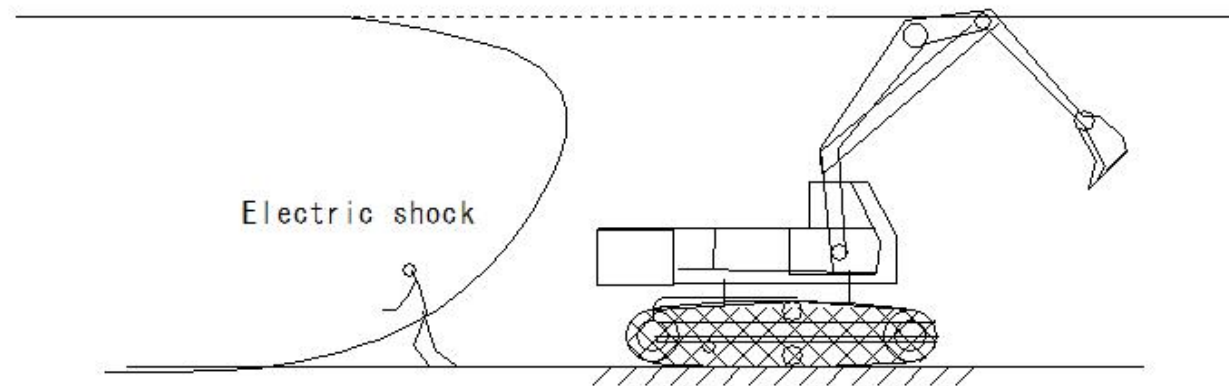
C1051
M420

S247

(S285)Accident type classification

(S285)Accident type classification

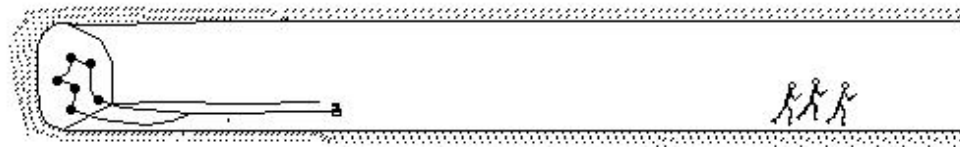
13 Electric shock: Touching a charged object, shock to a person due to discharge



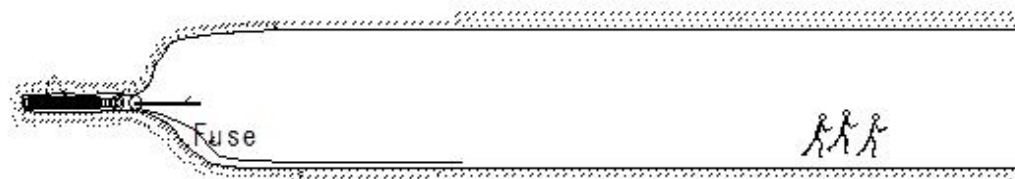
(S286)Accident type classification

(S286)Accident type classification

14 Explosion:



electric blasting



blasting the fuse

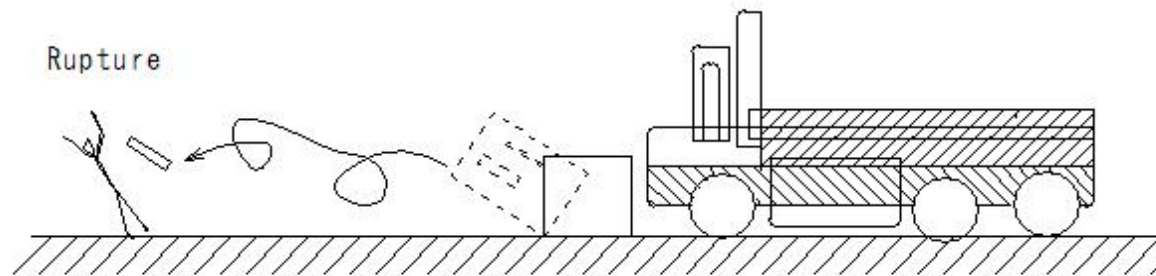
S140

S261

(S287)Accident type classification

(S287)Accident type classification

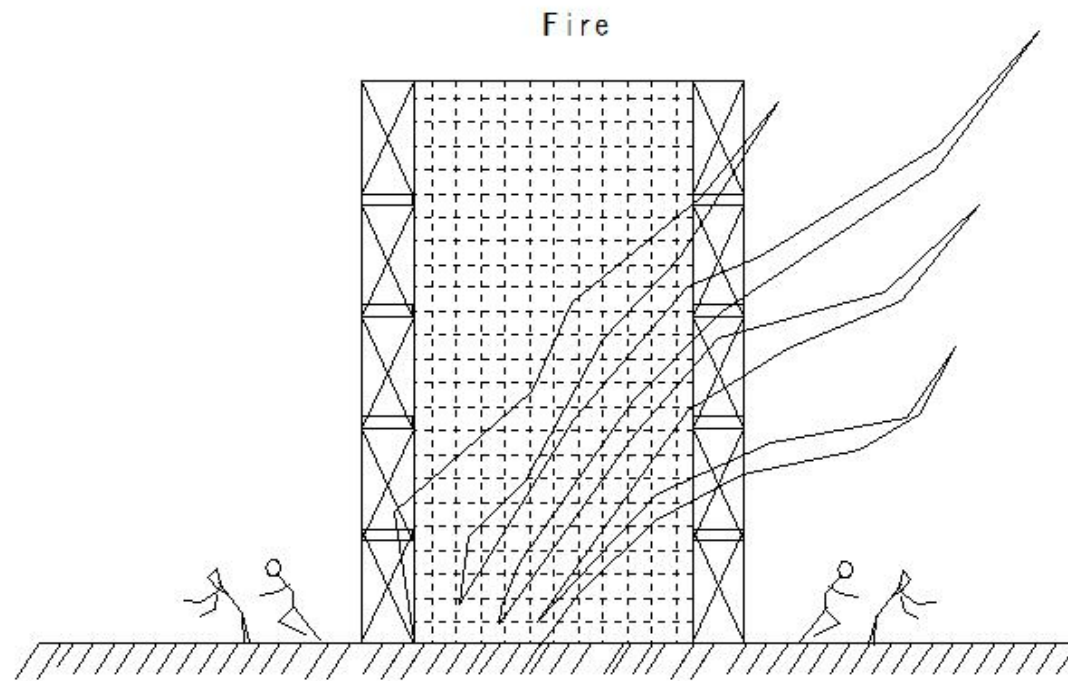
15 Rupture: Rupture of a container



(S288)Accident type classification

(S288)Accident type classification

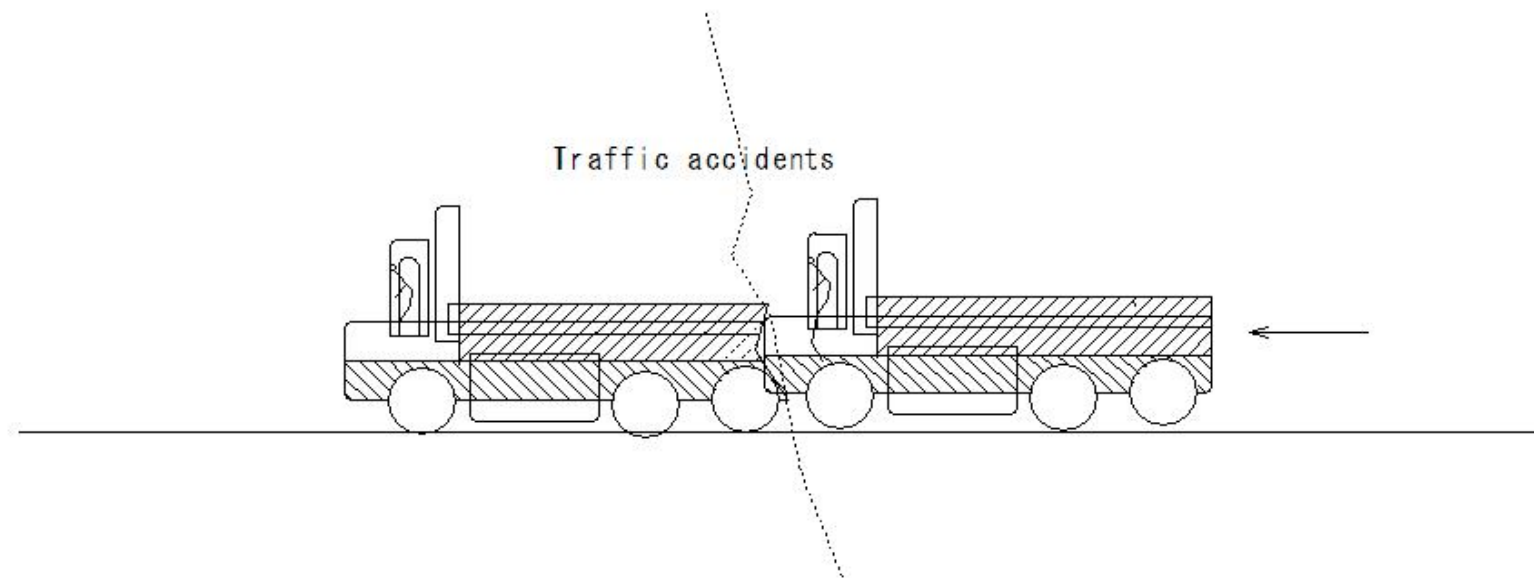
16 Fire



(S289)Accident type classification

(S289)Accident type classification

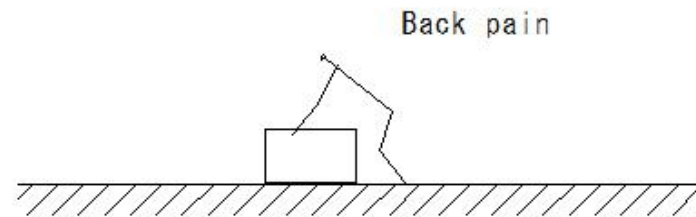
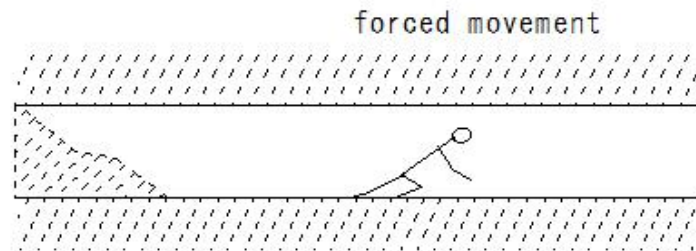
17, 18 Traffic accidents



(S290)Accident type classification

(S290)Accident type classification

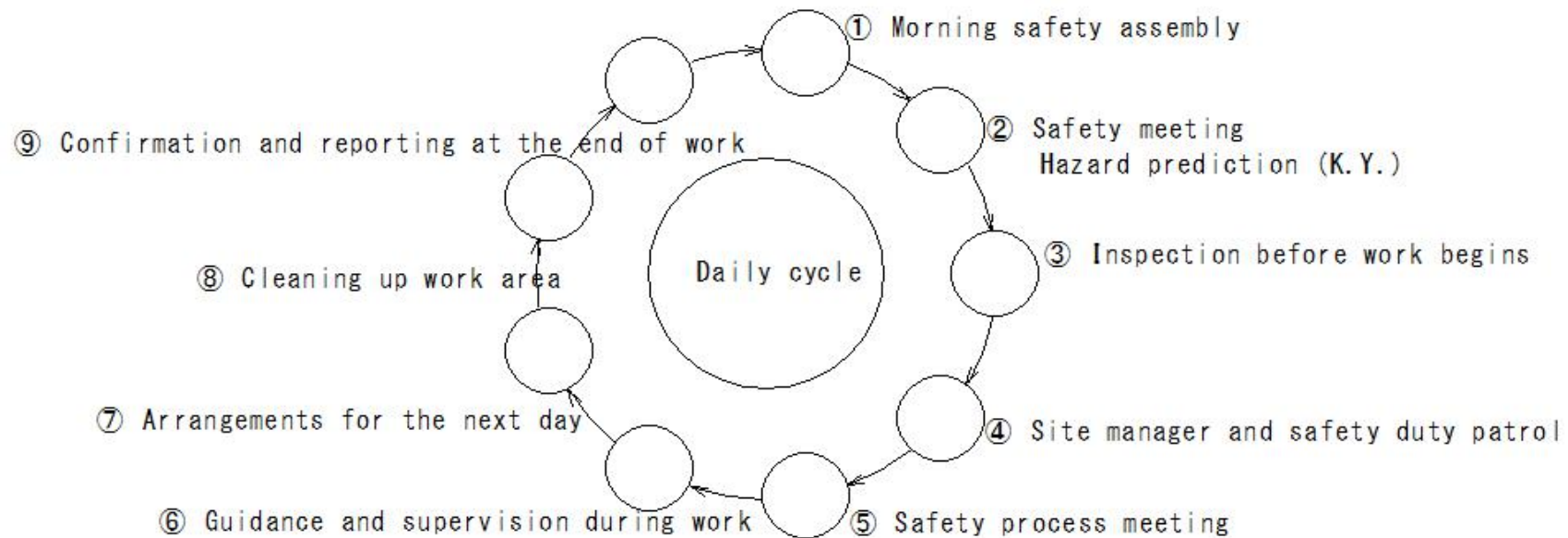
19 Recoil from movement, forced movement: Back pain, unnatural posture, forced movement



(S291)Safety construction cycle

(S291)Safety construction cycle

Safety construction cycle



(S292) Safety construction cycle

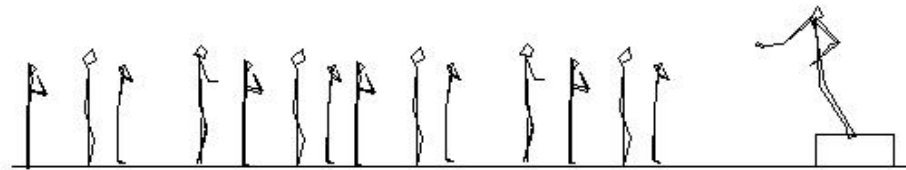
(S292) Safety construction cycle

Safety construction cycle

Daily cycle

① Morning safety assembly

① Morning safety assembly



(S293)Safety construction cycle

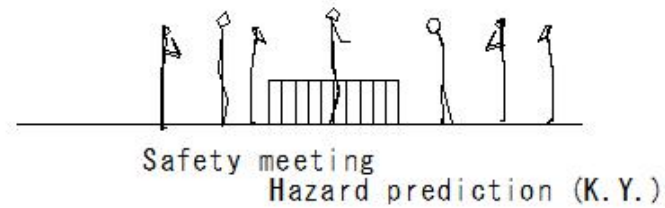
(S293)Safety construction cycle

Safety construction cycle

Daily cycle

② Safety meeting

Hazard prediction (K.Y.)



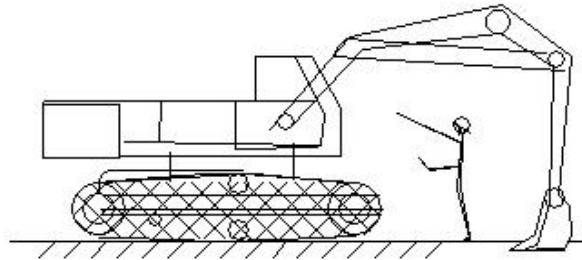
(S294) Safety construction cycle

(S294) Safety construction cycle

Safety construction cycle

Daily cycle

③ Inspection before work begins



Inspection before work begins

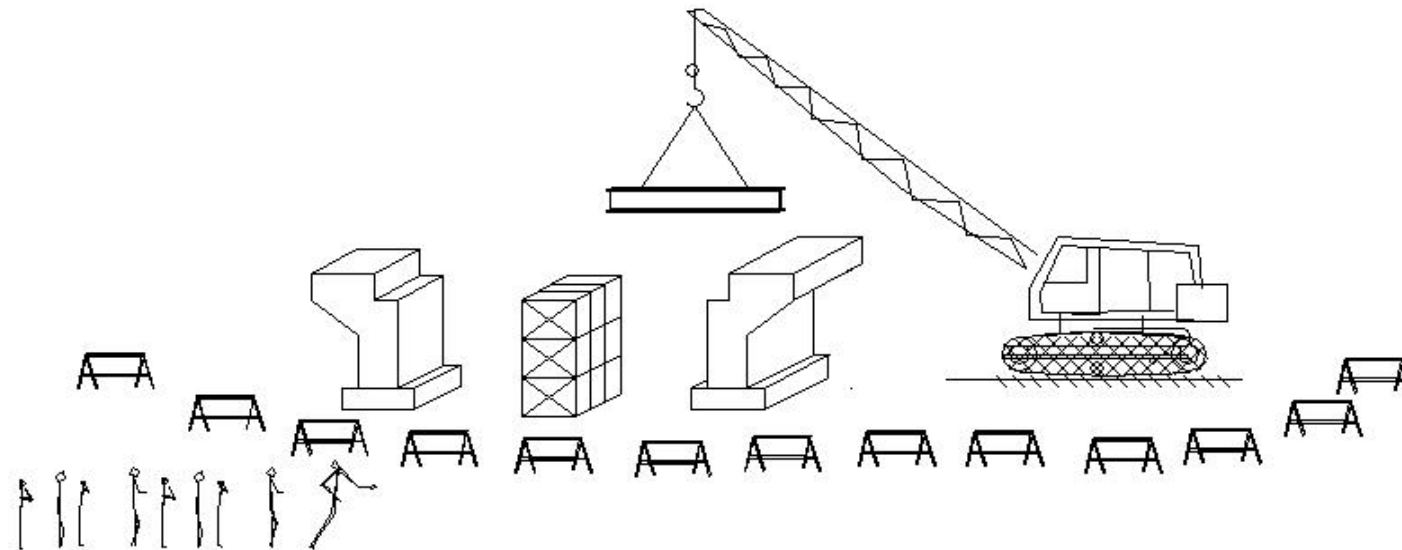
(S295)Safety construction cycle

(S295) Safety construction cycle

Safety construction cycle

Daily cycle

④ Site manager and safety duty patrol



Site manager and safety duty patrol

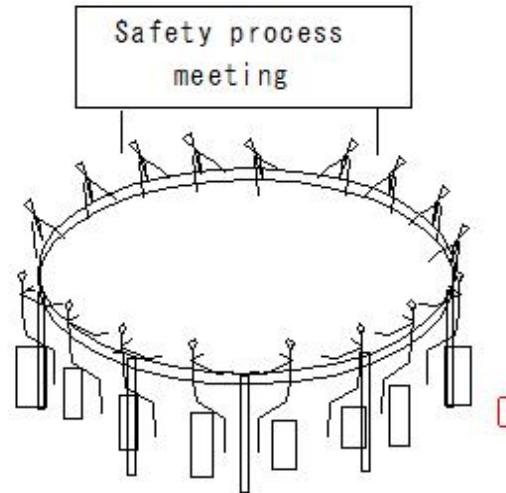
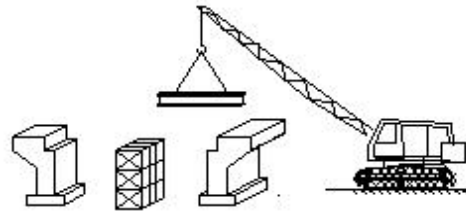
(S296) Safety construction cycle

(S296) Safety construction cycle

Safety construction cycle

Daily cycle

⑤ Safety process meeting



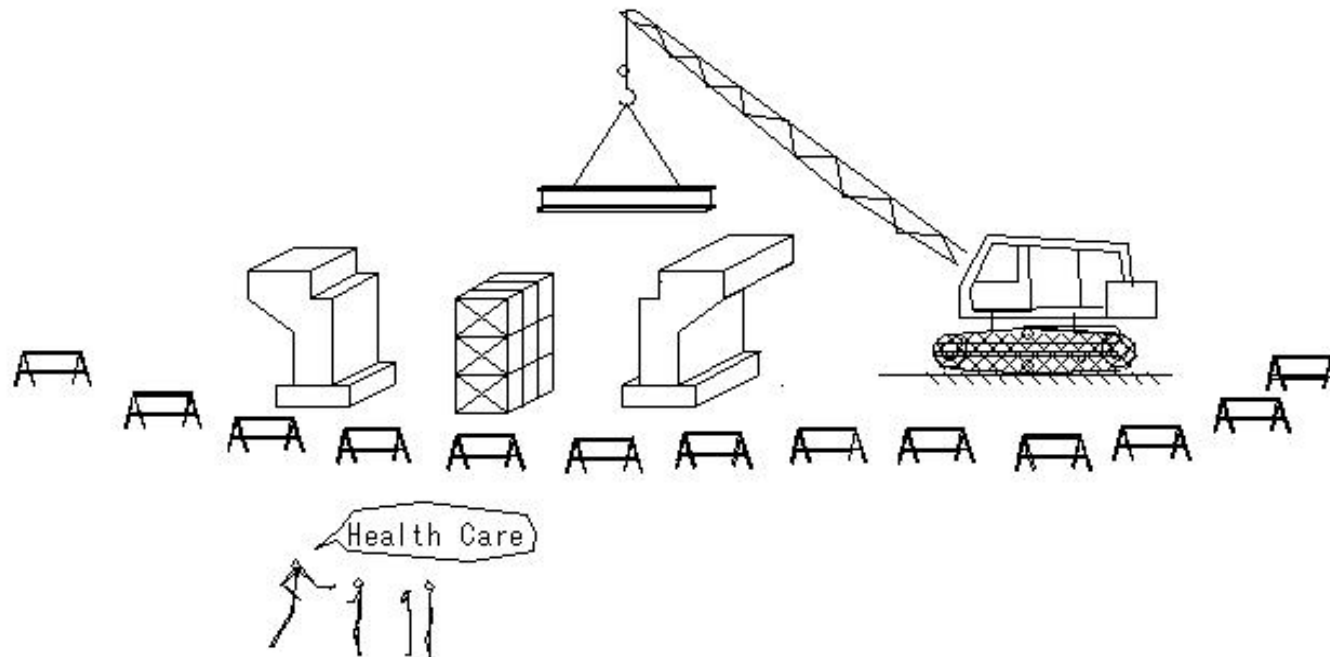
(S297)Safety construction cycle

(S297)Safety construction cycle

Safety construction cycle

Daily cycle

⑥ Guidance and supervision during work



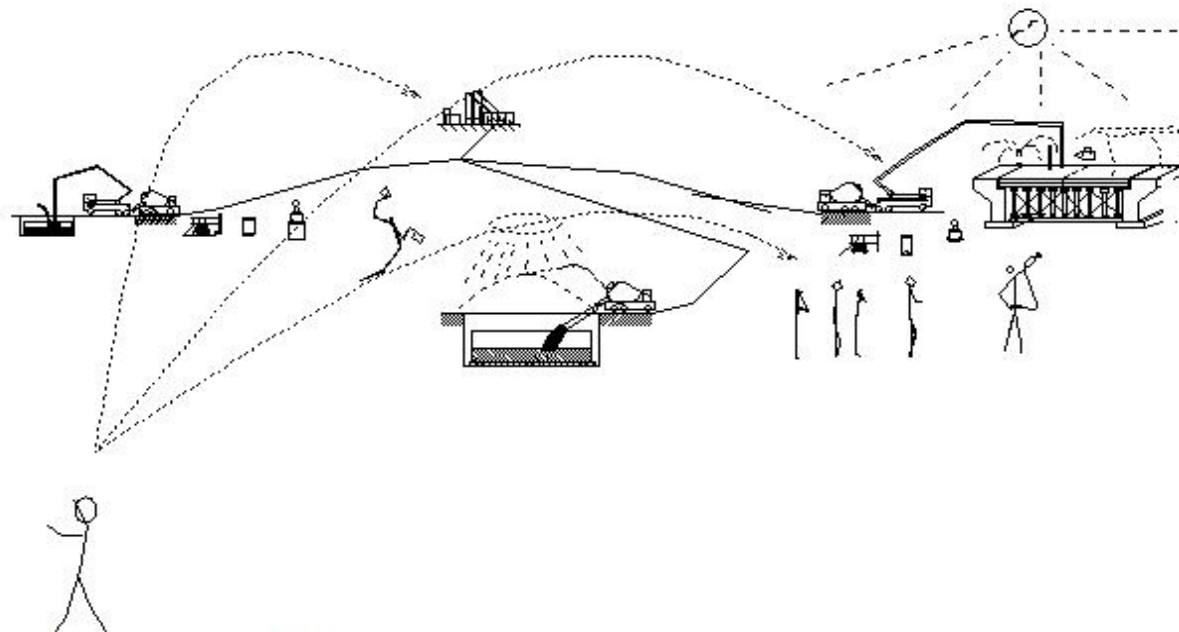
(S298)Safety construction cycle

(S298) Safety construction cycle

Safety construction cycle

Daily cycle

⑦ Arrangements for the next day



Arrangements for the next day

M423

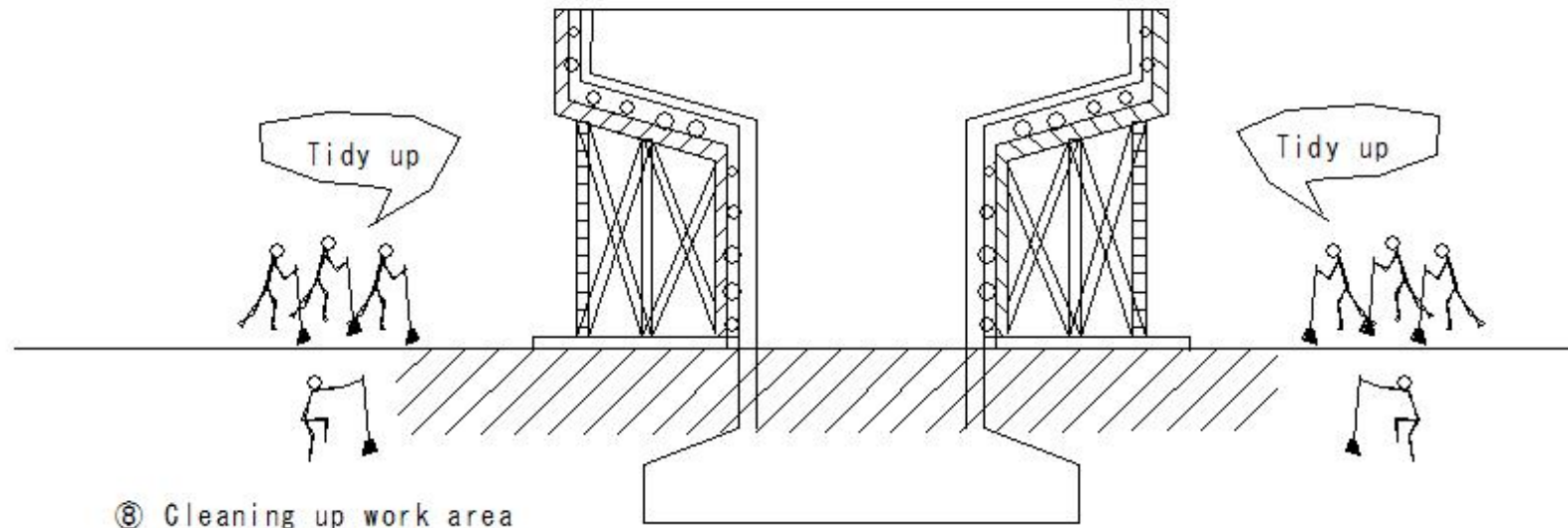
(S299) Safety construction cycle

(S299) Safety construction cycle

Safety construction cycle

Daily cycle

⑧ Cleaning up work area



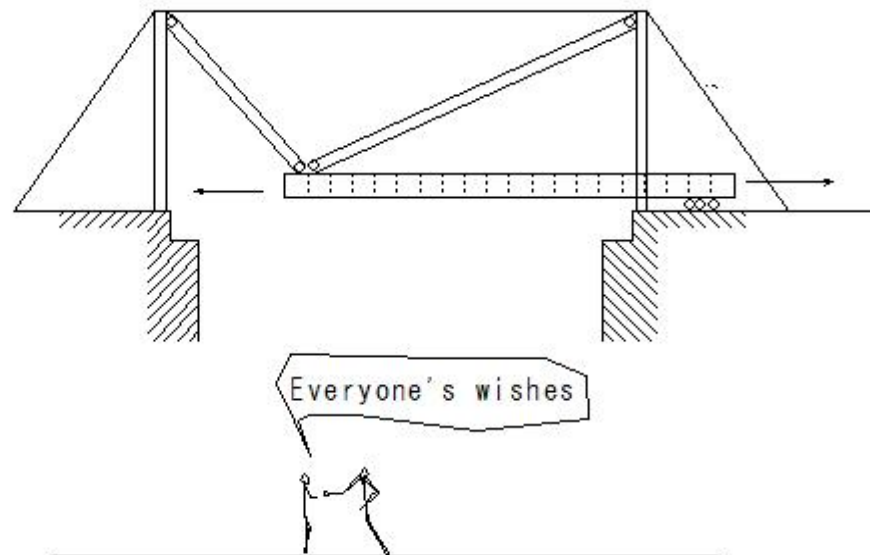
(S300) Safety construction cycle

(S300) Safety construction cycle

Safety construction cycle

Daily cycle

⑨ Confirmation and reporting at the end of work



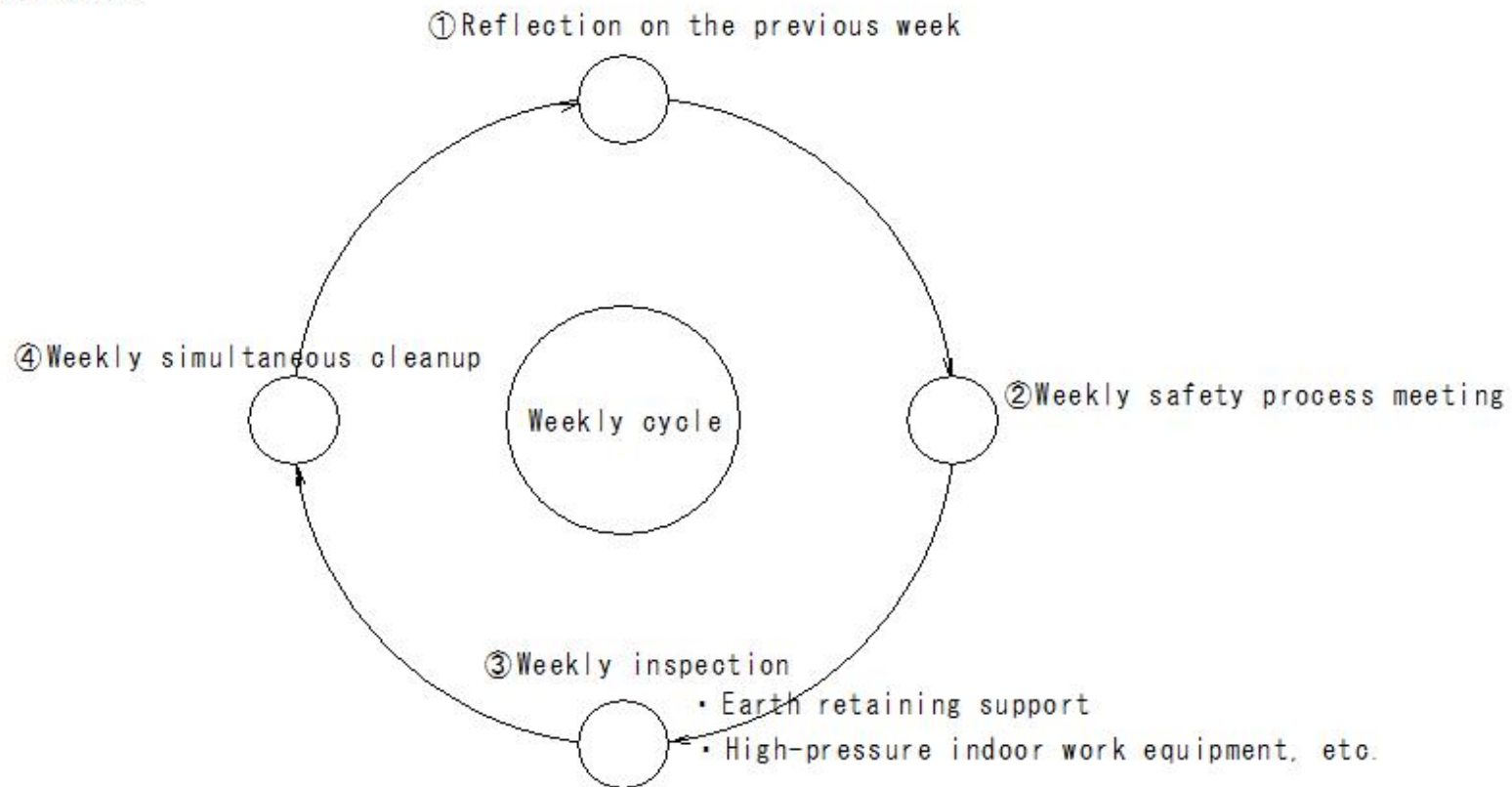
Confirmation and reporting at the end of work

(S301) Safety construction cycle

(S301) Safety construction cycle

Safety construction cycle

Weekly cycle



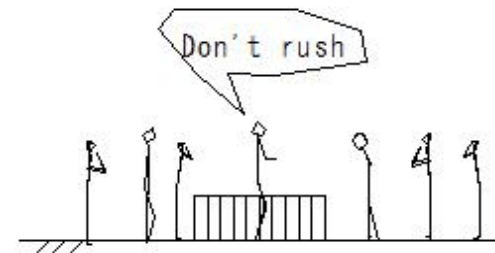
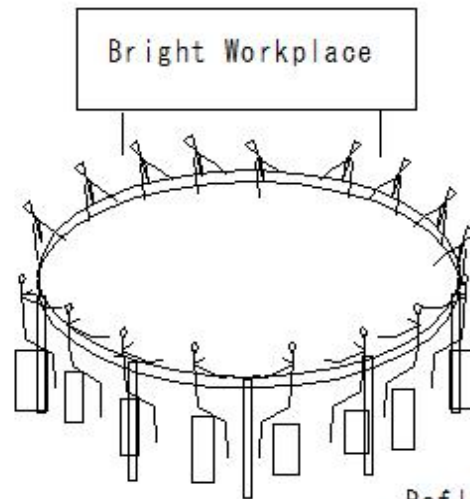
(S302)Safety construction cycle

(S302)Safety construction cycle

Safety construction cycle

Weekly cycle

①Reflection on the previous week



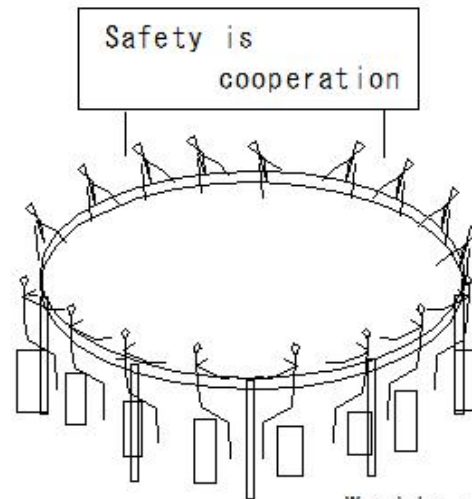
Reflection on the previous week

(S303)Safety construction cycle

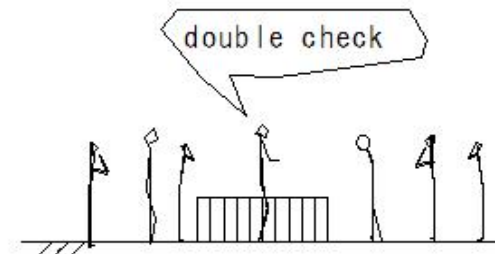
(S303)Safety construction cycle

Safety construction cycle

Weekly cycle



Weekly safety process meeting



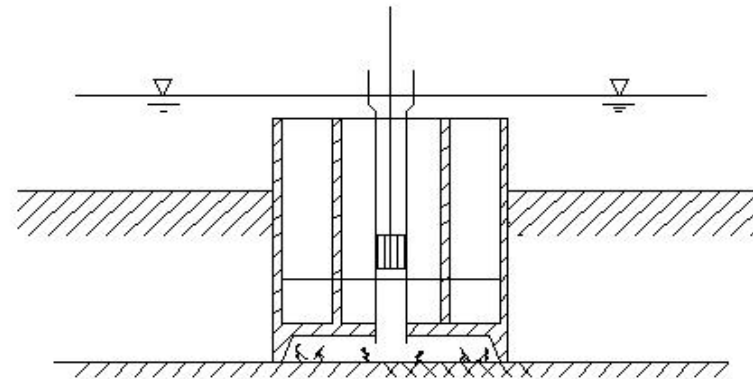
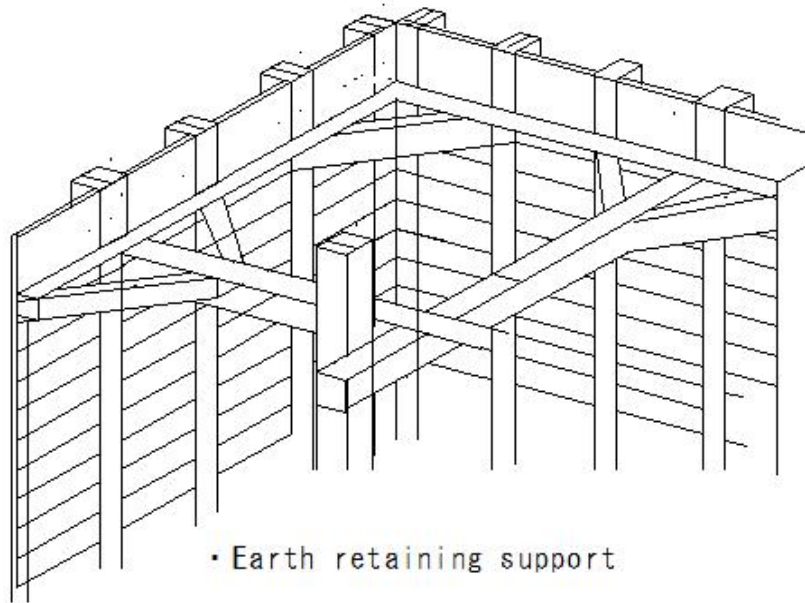
(S304) Safety construction cycle

(S304) Safety construction cycle

Safety construction cycle

Weekly cycle

③ Weekly inspection



Inspection and
maintenance



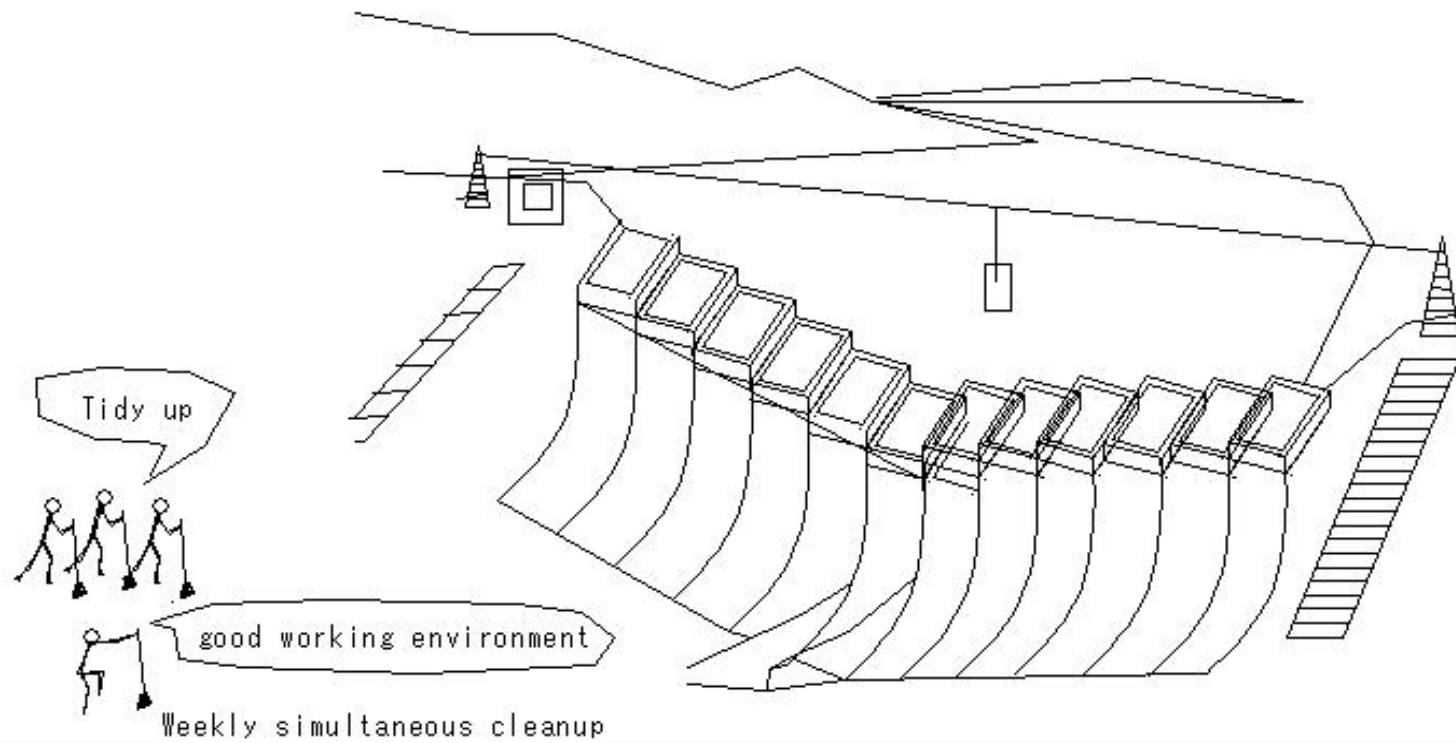
(S305)Safety construction cycle

(S305)Safety construction cycle

Safety construction cycle

Weekly cycle

④ Weekly simultaneous cleanup



(S306) Safety construction cycle

(S306) Safety construction cycle

Safety construction cycle

Monthly cycle

① Safety and health education, etc.

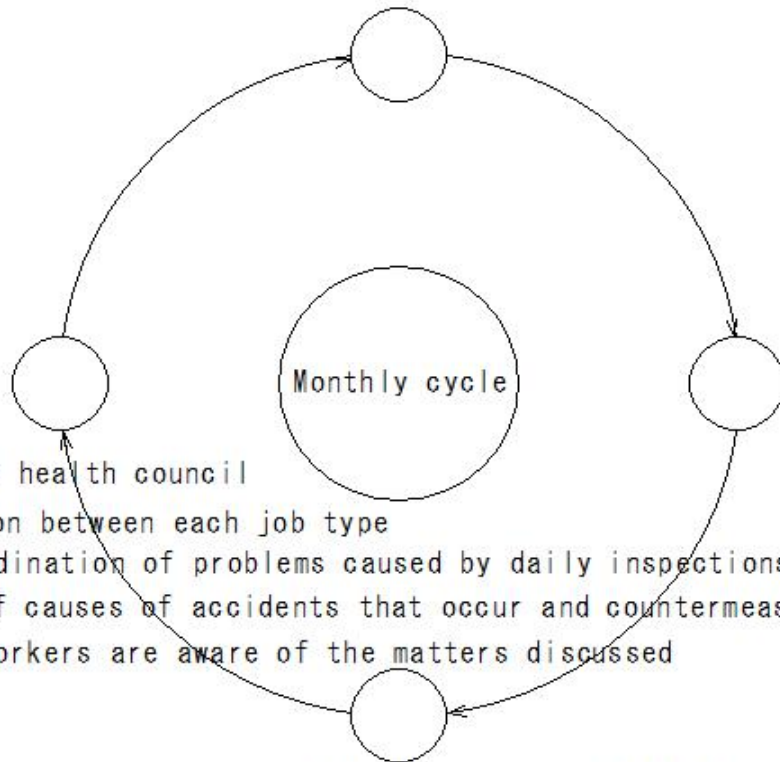
Monthly cycle

② Safety and health conference

④ Safety and health council

- Work coordination between each job type
- Review and coordination of problems caused by daily inspections
- Investigation of causes of accidents that occur and countermeasures
- Make sure all workers are aware of the matters discussed

③ Regular voluntary inspection



(S307) Safety construction cycle

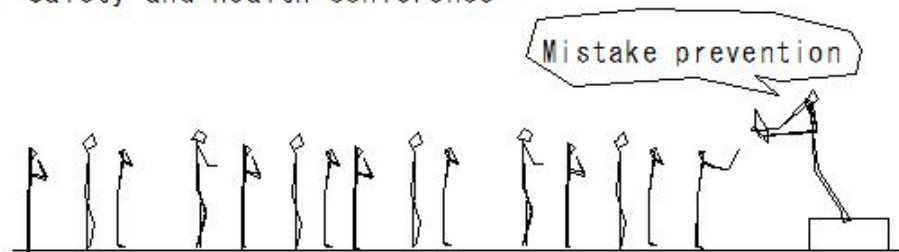
(S307) Safety construction cycle

Safety construction cycle

Monthly cycle

- ① Safety and health education, etc.
- ② Safety and health conference

Safety and health education, etc.
Safety and health conference



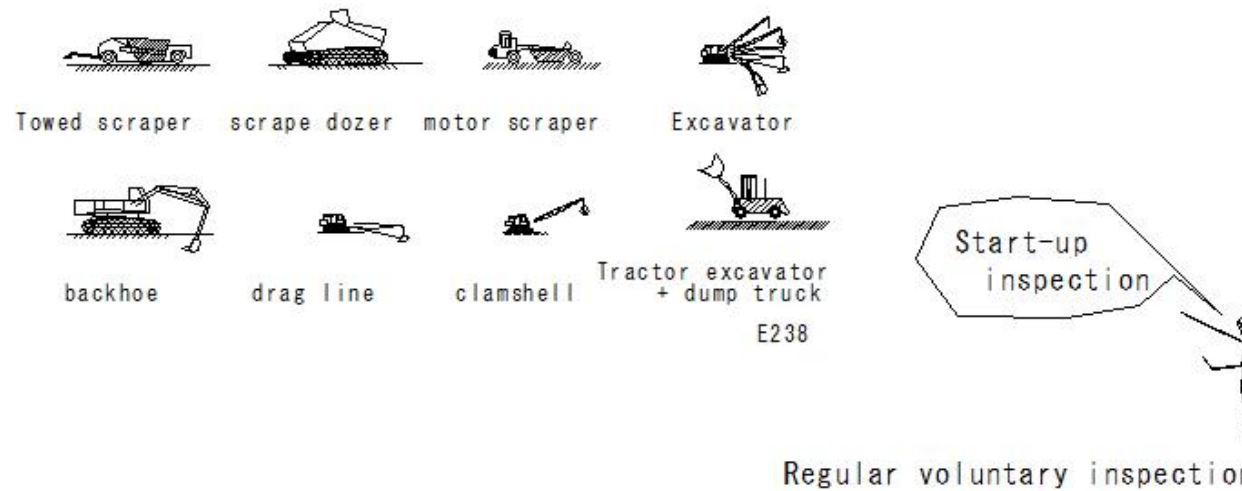
(S308) Safety construction cycle

(S308) Safety construction cycle

Safety construction cycle

Monthly cycle

③ Regular voluntary inspection



(S309) Safety construction cycle

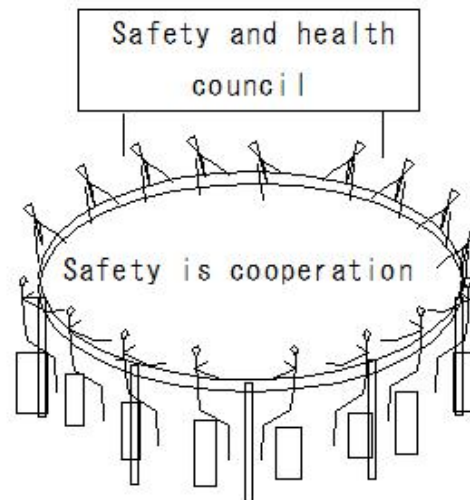
(S309) Safety construction cycle

Safety construction cycle

Monthly cycle

④ Safety and health council

- Work coordination between each job type
- Review and coordination of problems caused by daily inspections
- Investigation of causes of accidents that occur and countermeasures
- Make sure all workers are aware of the matters discussed



(S310) Safety construction cycle

(S310) Safety construction cycle

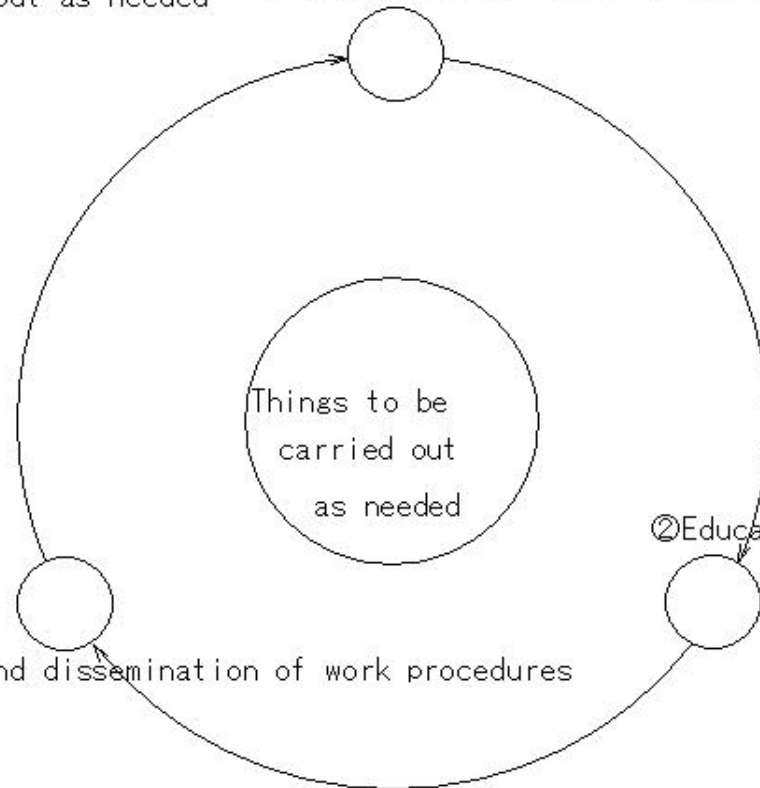
Safety construction cycle

Things to be carried out as needed

① Preliminary meetings with contractors planning to enter

② Education for new workers

③ Preparation and dissemination of work procedures
Work methods
Dissemination



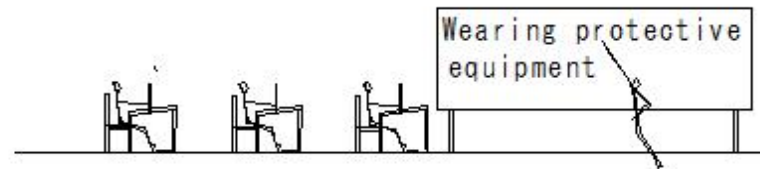
(S311)Safety construction cycle

(S311)Safety construction cycle

Safety construction cycle

Things to be carried out as needed

①Preliminary meetings with contractors planning to enter



Preliminary meetings with contractors planning to enter

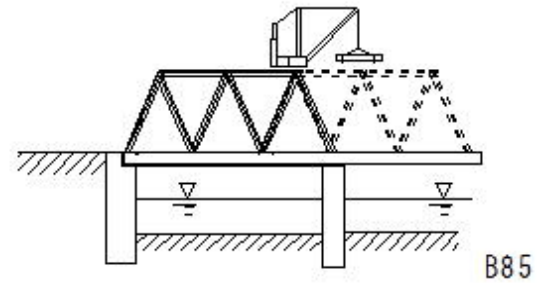
(S312)Safety construction cycle

(S312) Safety construction cycle

Safety construction cycle

Things to be carried out as needed

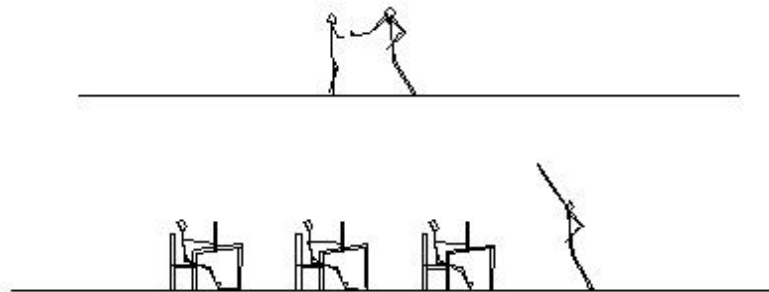
② Education for new workers



life ropes

safety harnesses

S218



Education for new workers

S263

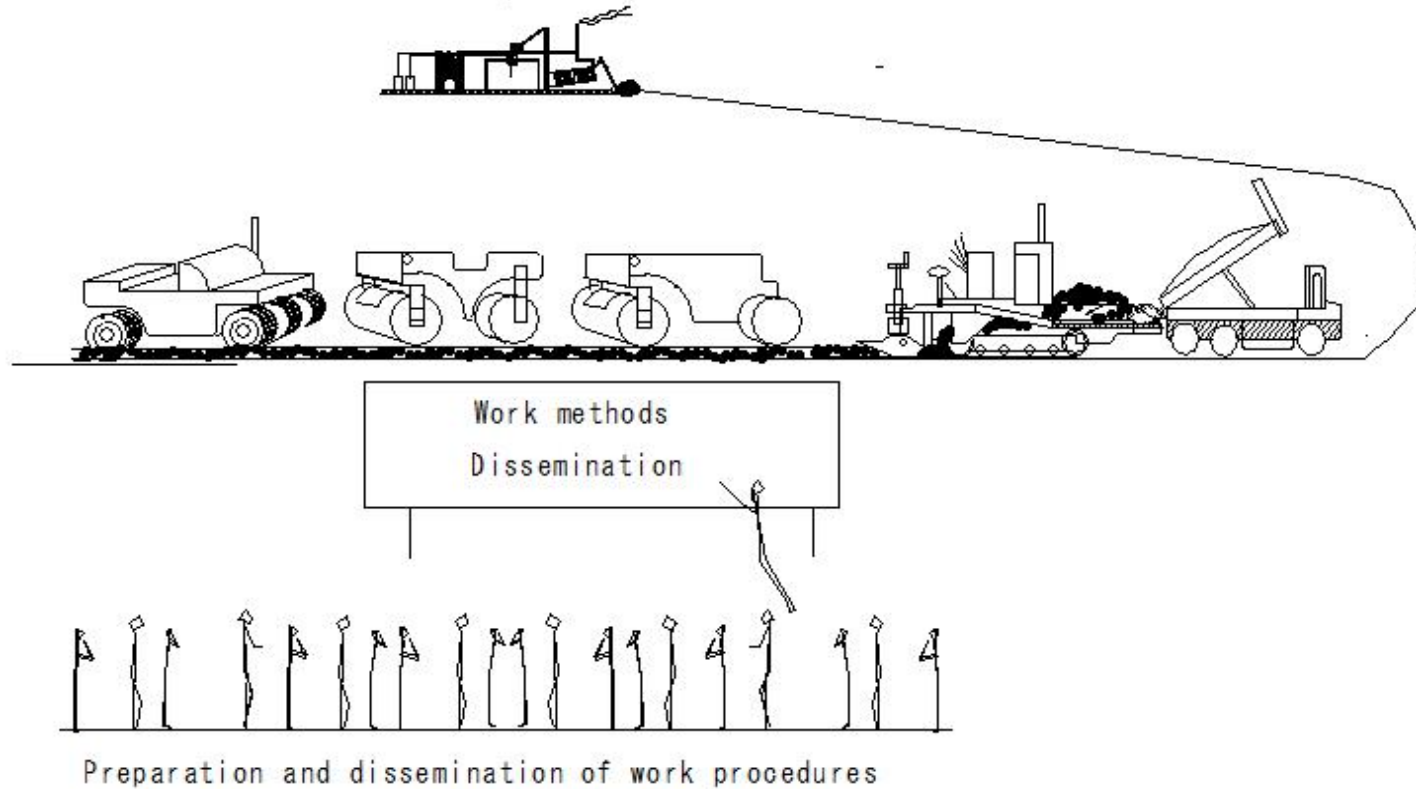
(S313)Safety construction cycle

(S313)Safety construction cycle

Safety construction cycle

Things to be carried out as needed

③Preparation and dissemination of work procedures



(S314) Safety measures for machinery

(S314) Safety measures for machinery

Safety measures for machinery

Flow of creating a work plan for construction machinery

Create a construction plan → Instruct partner companies

What kind of machinery is necessary

① Instruct crane work to lift loads that exceed the lifting capacity

② Mobile crane

③ Construction elevator

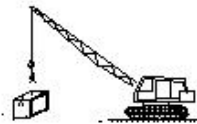
④ Main construction machinery and other construction machinery

⑤ Tracking device

⑥ Other machinery

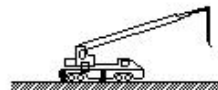
construction plan

①



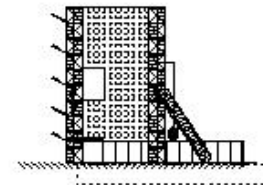
M45
F364

②



S48
M393

③



S227

④

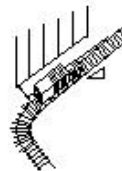


F30

F375

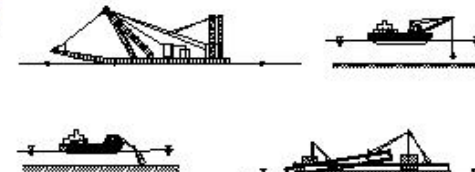
F31

⑤



S126

⑥



E376

(S315) Safety measures for machinery

(S315) Safety measures for machinery

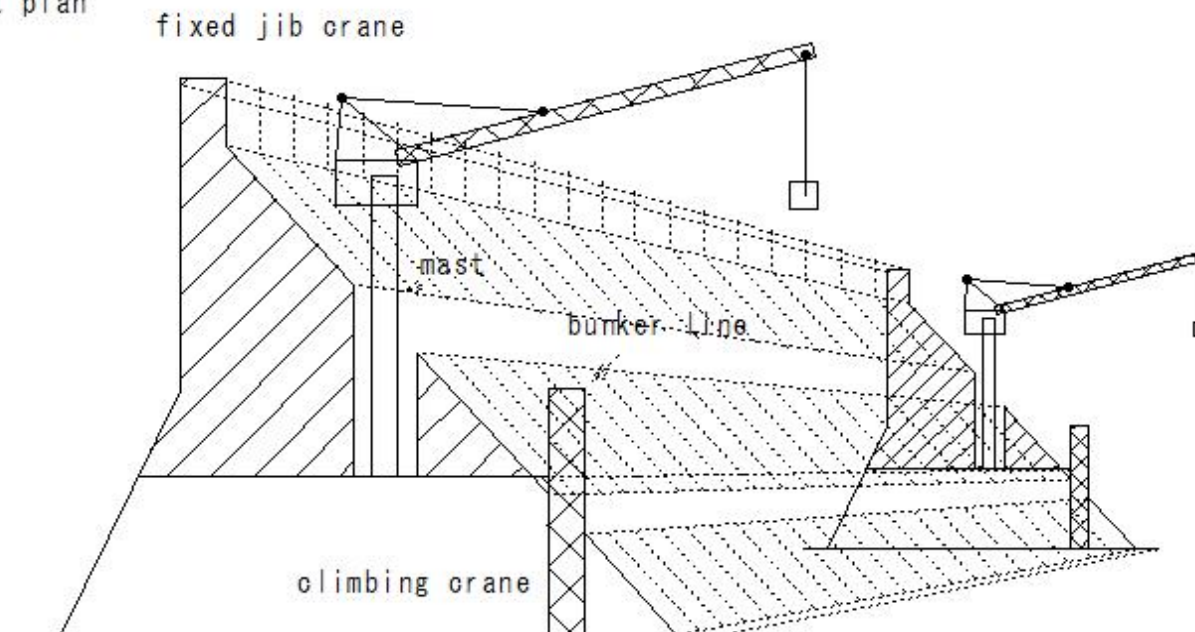
Safety measures for machinery

Flow of creating a work plan for construction machinery

Plan contents

Construction plan

- ① Overall schedule
- ② Machine loading and unloading plan
- ③ Machine layout plan



D27
C1036

(S316) Safety measures for machinery

(S316) Safety measures for machinery

Safety measures for machinery

Flow of creating a work plan for construction machinery

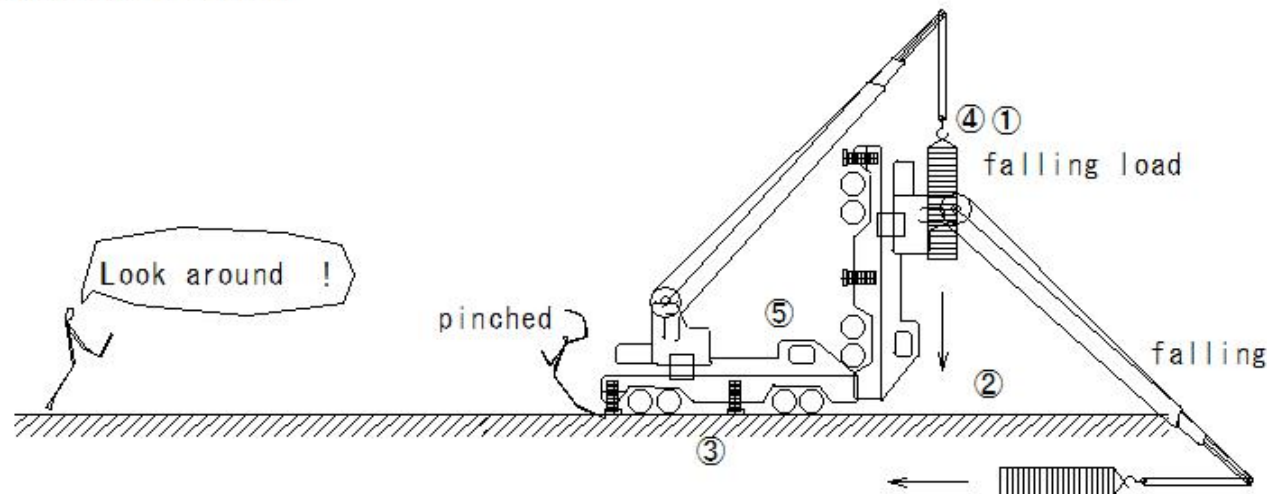
Mobile crane

- Prevention of falling, getting pinched, falling load, and electric shock

Work method

- ① Lifting load at one time
- ② Loading and unloading position
- ③ Installation position
- ④ Slings method
- ⑤ Operation method

electric shock



S228-S236

S124

M393

(S317) Safety measures for machinery

(S317) Safety measures for machinery

Safety measures for machinery

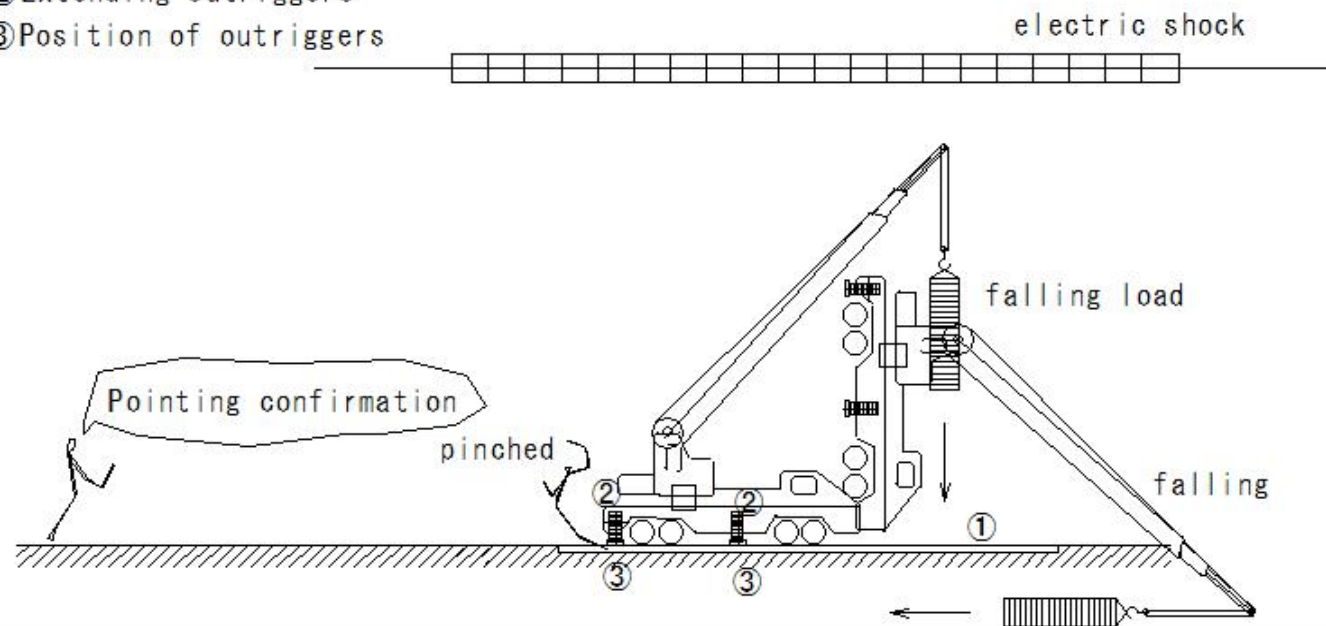
Flow of creating a work plan for construction machinery

Mobile crane

- Prevention of falling, getting pinched, falling load, and electric shock

How to prevent falls

- ① Iron plate flooring
- ② Extending outriggers
- ③ Position of outriggers



S228-S236

S124

M393

(S318) Safety measures for machinery

(S318) Safety measures for machinery

Safety measures for machinery

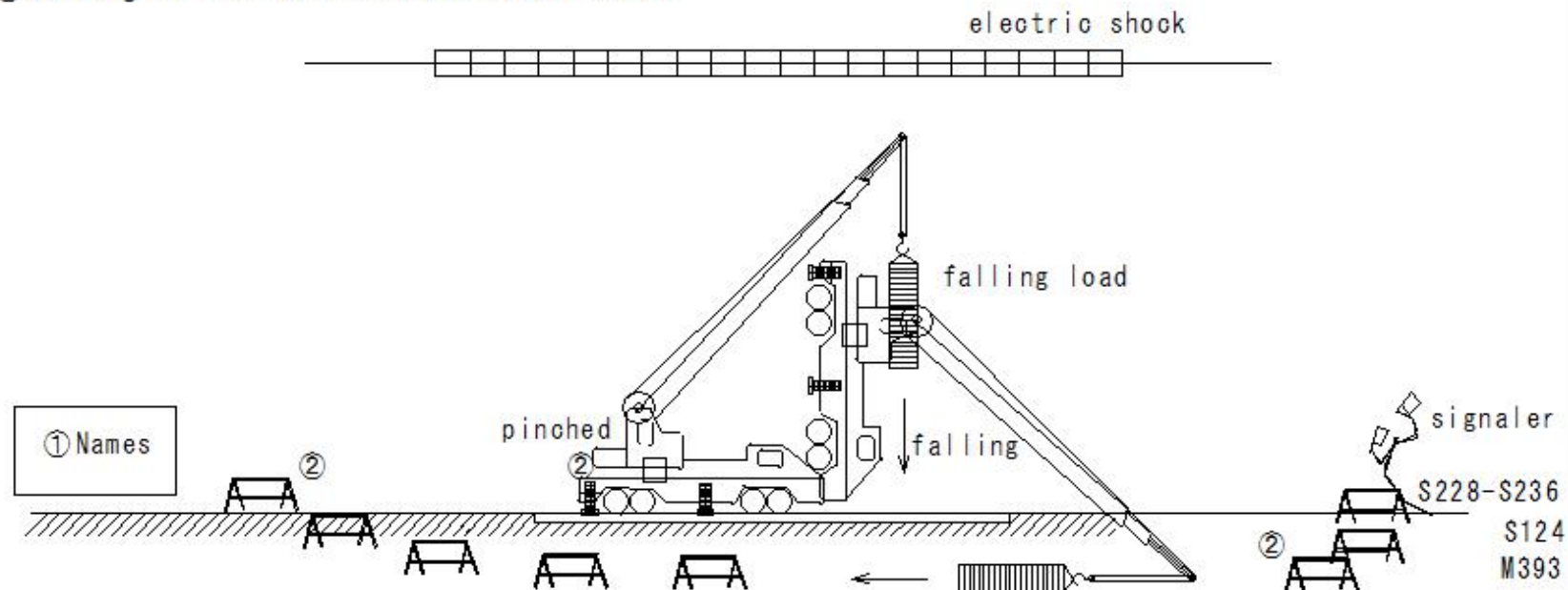
Flow of creating a work plan for construction machinery

Mobile crane

- Prevention of falling, getting pinched, falling load, and electric shock

Disposition of workers and chain of command

- ① Names of leader, slinger, and signaler
- ② Setting of work area and off-limits areas



(S319)Flow of creating a work plan for construction machinery

(S319)Flow of creating a work plan for construction machinery

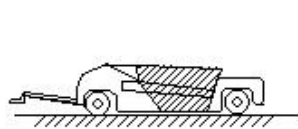
Safety measures for machinery

Flow of creating a work plan for construction machinery

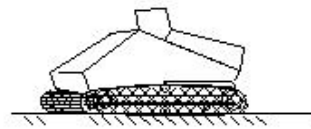
Vehicle construction machinery

①Topography of the work site

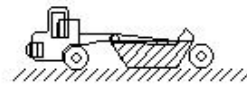
②Geological survey and recording



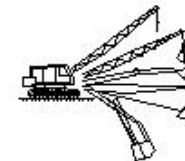
Towed scraper



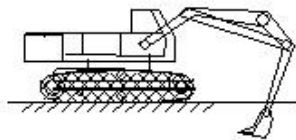
scrape dozer



motor scraper



Excavator



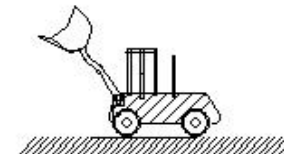
backhoe



drag line



clamshell



Tractor excavator
+ dump truck

E238
M134

(S320)Flow of creating a work plan for construction machinery

(S320)Flow of creating a work plan for construction machinery

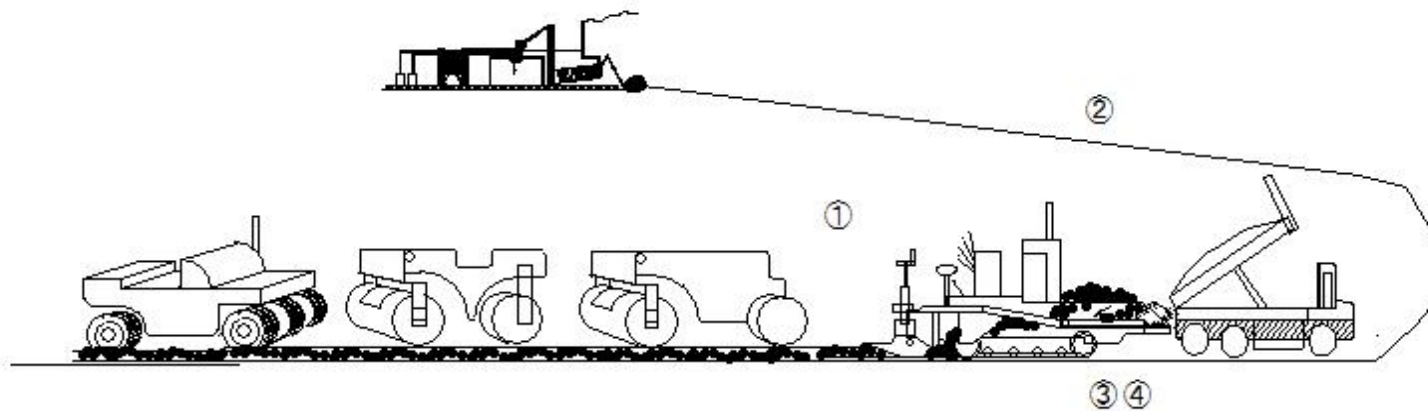
Safety measures for machinery

Flow of creating a work plan for construction machinery

Vehicle construction machinery

Work plan contents

- ① Type and capacity of machine
- ② Travel route
- ③ Work method
- ④ Installation location



(S321)Flow of creating a work plan for construction machinery

(S321)Flow of creating a work plan for construction machinery

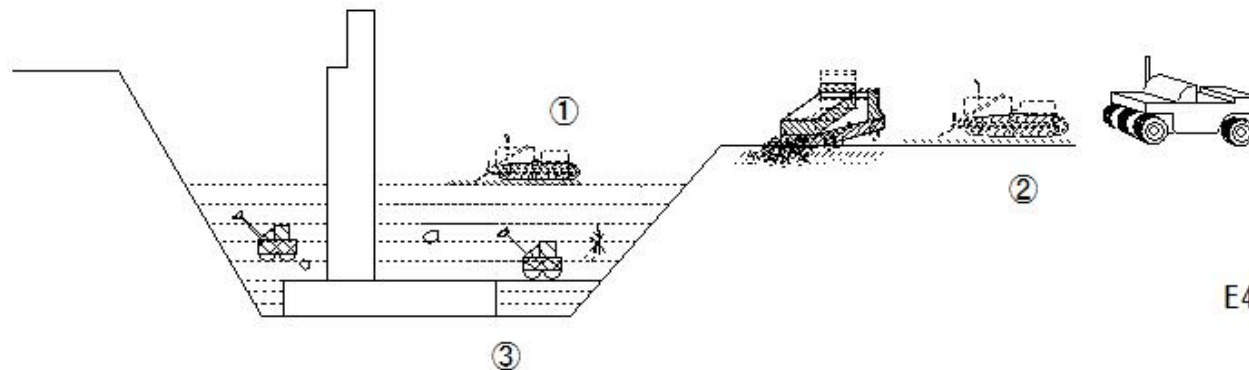
Safety measures for machinery

Flow of creating a work plan for construction machinery

Vehicle construction machinery

Work plan contents

- ①Size and topography of the work area
- ②Type and capacity of the machinery
- ③Type and shape of the load



E443

(S322)Flow of creating a work plan for construction machinery

(S322)Flow of creating a work plan for construction machinery

Safety measures for machinery

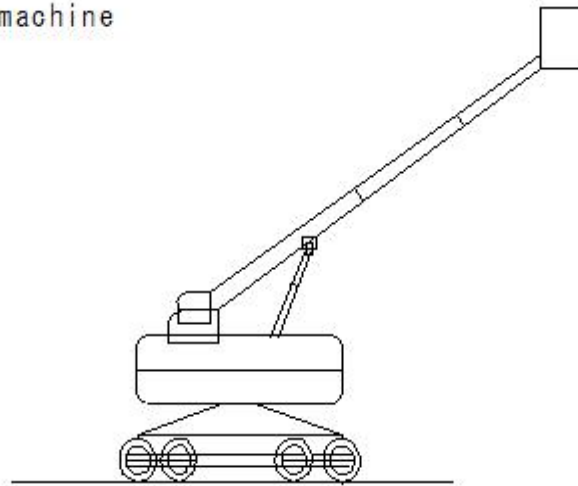
Flow of creating a work plan for construction machinery

Vehicle-mounted construction machinery

- Contents of the work plan for work using aerial work vehicles

① Work location conditions

② Type and capacity of the machine

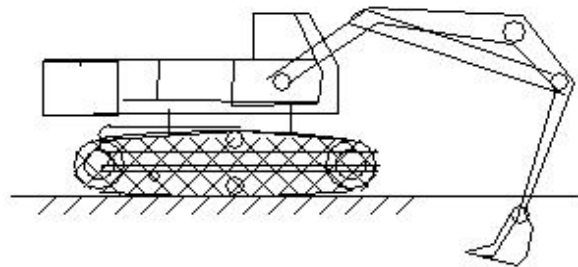
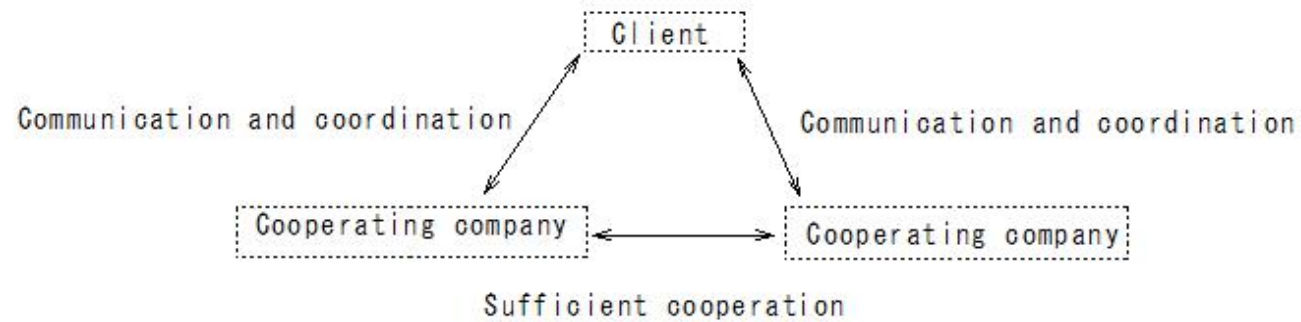


aerial work vehicles

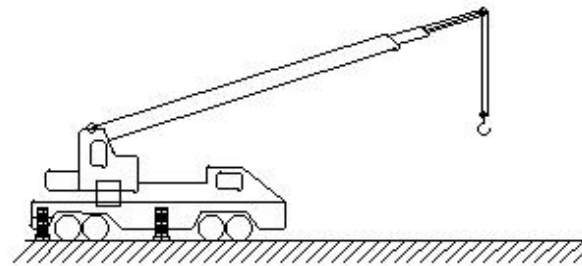
(S323) Specific work (mobile crane work, etc.)

(S323) Specific work (mobile crane work, etc.)

Coordination with clients for specific work (mobile crane work, etc.)



backhoe



Truck-crane

S258
M393

(S324) Specific work (mobile crane work, etc.)

(S324) Specific work (mobile crane work, etc.)

Coordination of communication between clients for specific work (mobile crane work, etc.)

Client - cooperating company - cooperating company

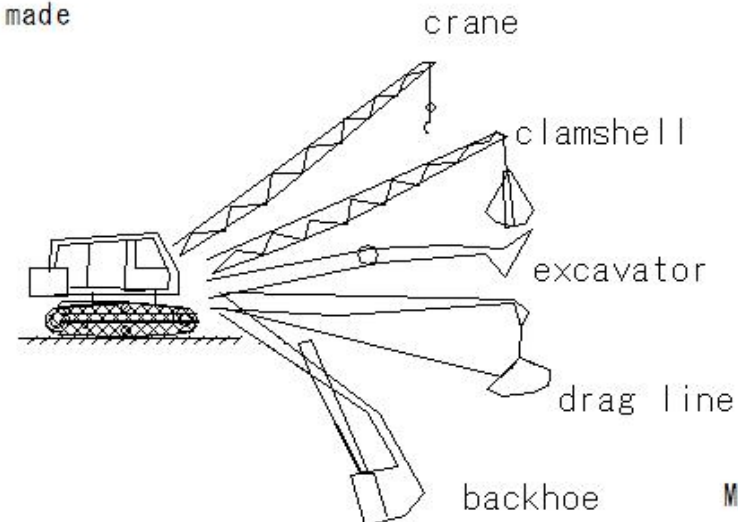
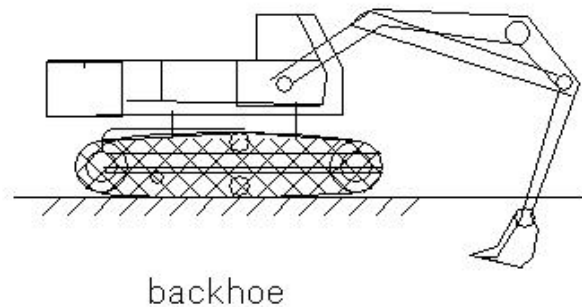
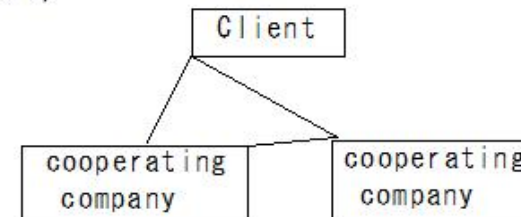
Power shovel, drag shovel, clamshell (machine weight 3t or more)

kind of work

Operation, slinging, and guidance work when lifting loads

Measures

- ① Content of work
- ② Chain of instructions
- ③ No entry measures
- Necessary communication and coordination must be made



M125

(S325) Specific work (mobile crane work, etc.)

(S325) Specific work (mobile crane work, etc.)

Coordination of communication between clients for specific work (mobile crane work, etc.)

Client - cooperating company - cooperating company

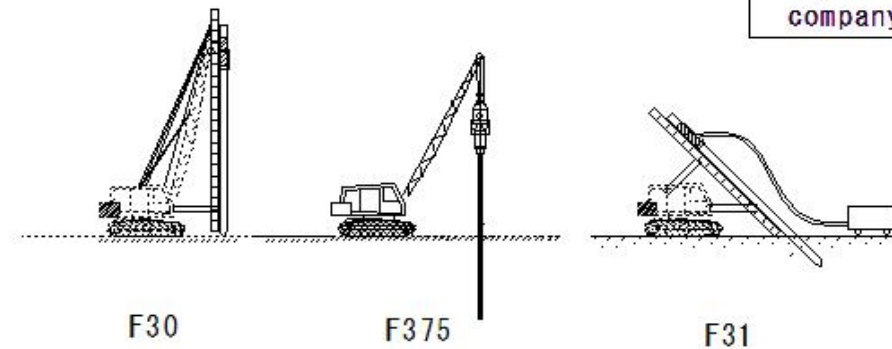
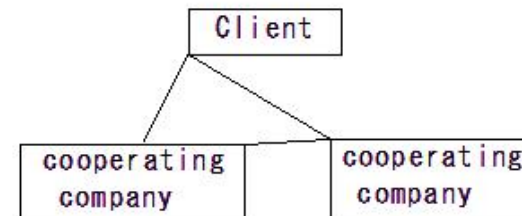
Pile driver, pile puller, earth drill, earth auger

kind of work

Driving, operating the work equipment, slinging, erecting piles, connecting piles, etc.

Measures

- ① Content of work
- ② Chain of instructions
- ③ No entry measures
- Necessary communication and coordination must be made



(S326) Specific work (mobile crane work, etc.)

(S326) Specific work (mobile crane work, etc.)

Coordination of communication between clients for specific work (mobile crane work, etc.)

Client - cooperating company - cooperating company

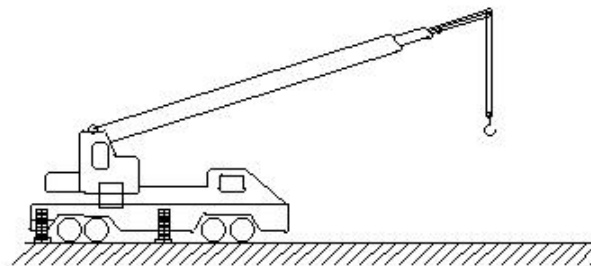
Mobile crane: Lifting load of 3 tons or more

kind of work

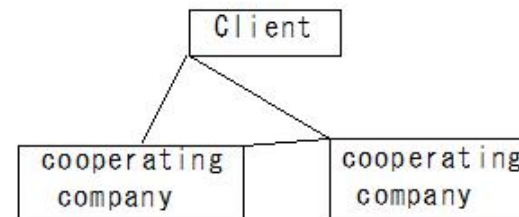
Operation, slinging, signaling work

Measures

- ① Content of work
- ② Chain of instructions
- ③ No entry measures
- Necessary communication and coordination must be made



Mobile crane
Truck-crane



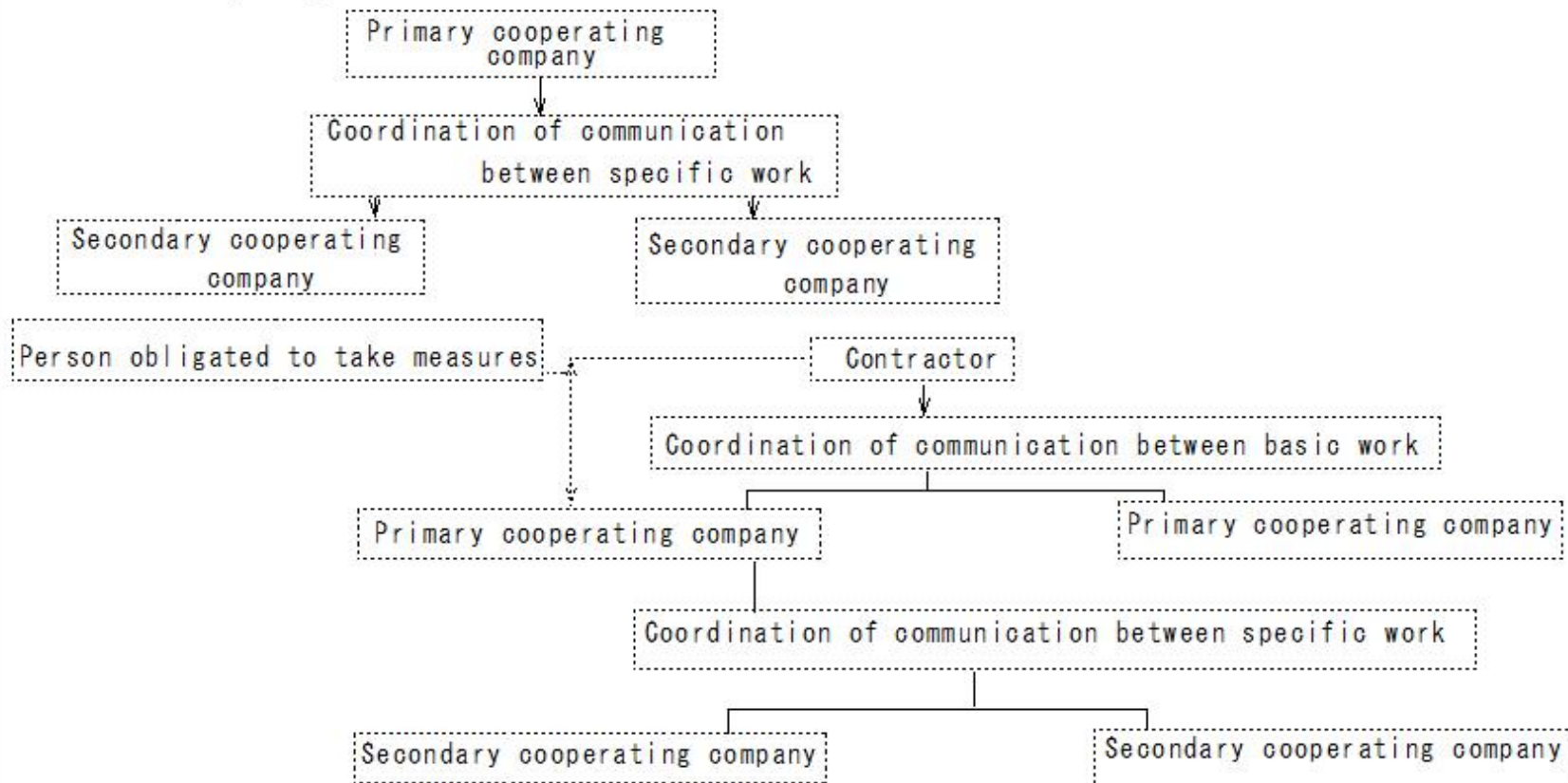
S258
M393

(S327) Specific work (mobile crane work, etc.)

(S327) Specific work (mobile crane work, etc.)

Coordination of communication between clients of specific work (mobile crane work, etc.)

Relationship diagram of measures



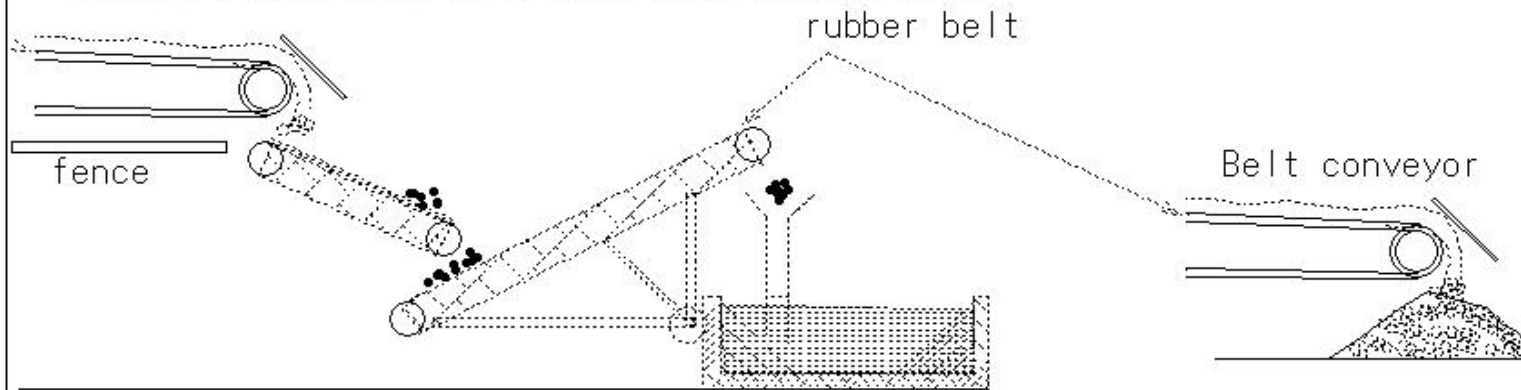
(S328)General standards for machinery

(S328)General standards for machinery

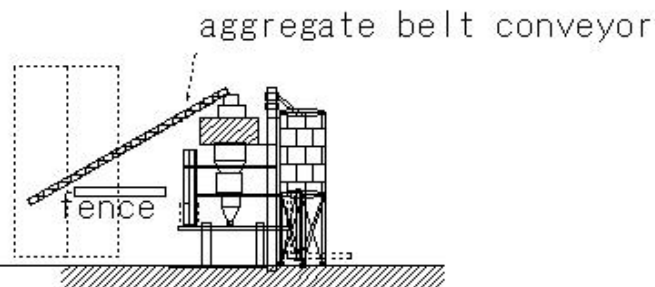
General standards for machinery

Prevention of danger caused by belt breakage

Install a fence below belts above roads and work areas



M368
C1329



M416
C1031

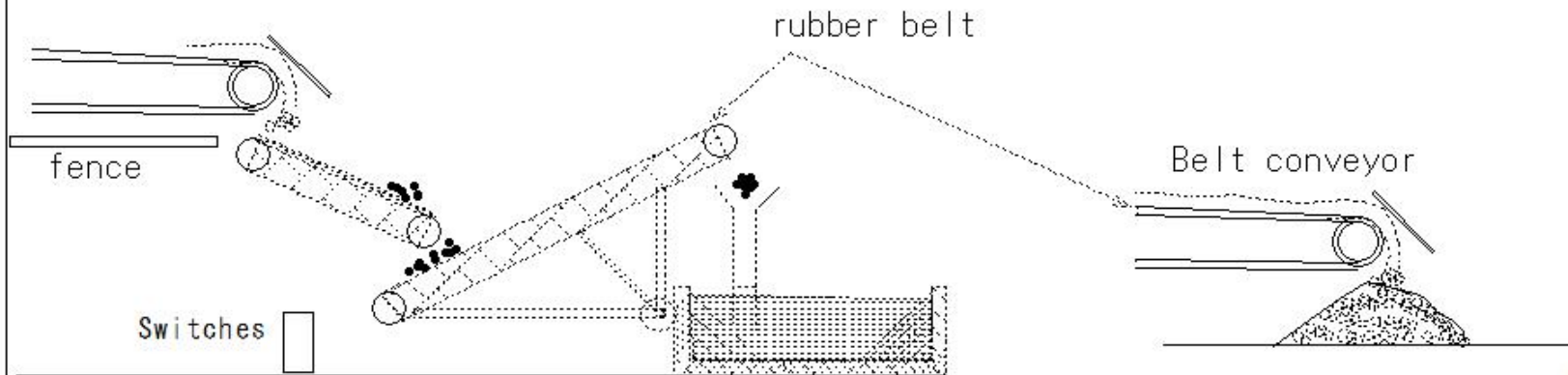
(S329)General standards for machinery

(S329)General standards for machinery

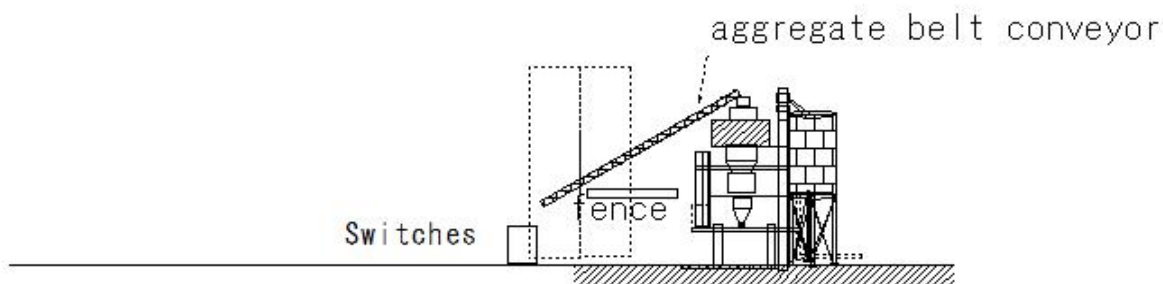
General standards for machinery

Power cut-off devices

Switches, etc. must be installed on each machine



M368
C1329



M416

(S330)General standards for machinery

(S330)General standards for machinery

General standards for machinery

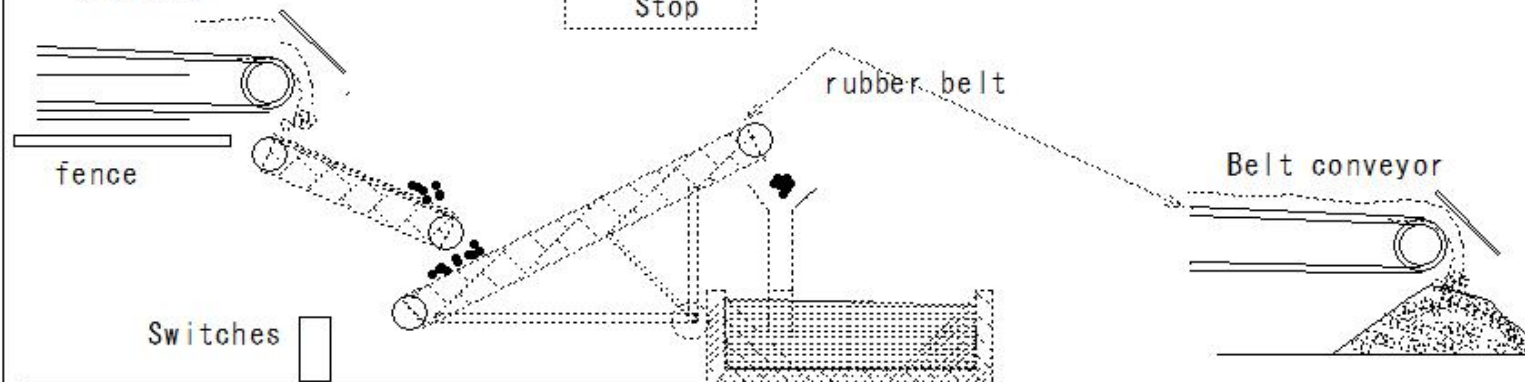
Stopping operation when cleaning, etc.

Stop operation when cleaning, refueling, inspecting, or repairing the machine

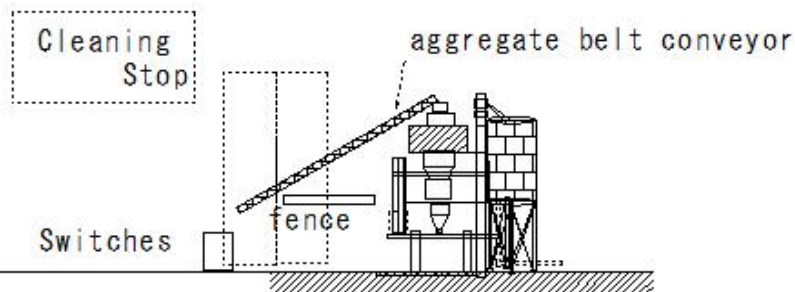
Lock and display the switch

Cleaning

Cleaning
Stop



M368
C1329



M416

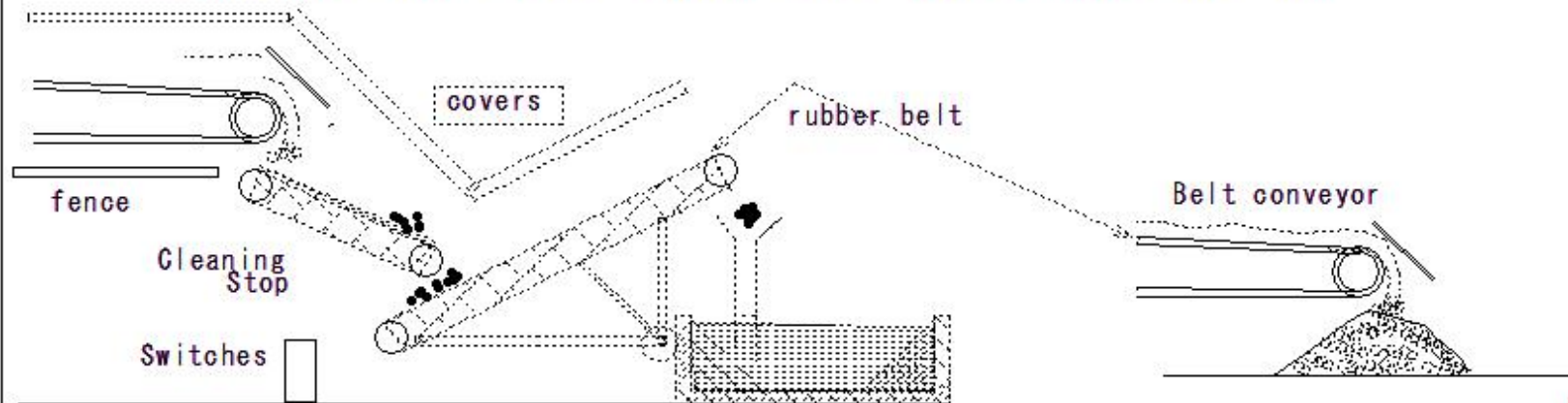
(S331)General standards for machinery

(S331)General standards for machinery

General standards for machinery

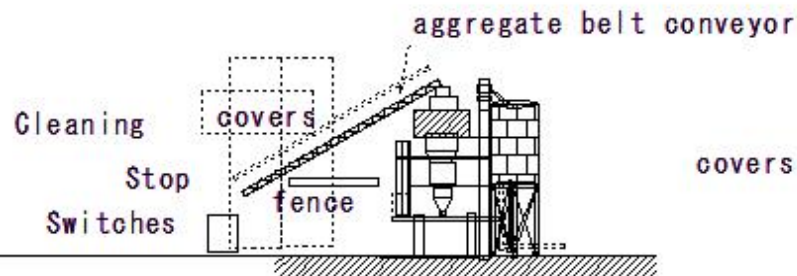
Prevention of dangers caused by engines, rotating shafts, etc.

Provide covers, enclosures, sleeves, crossing bridges, etc. for dangerous parts of machinery such as engines, rotating shafts, gears, pulleys, belts, etc.



M368

C1329



M416

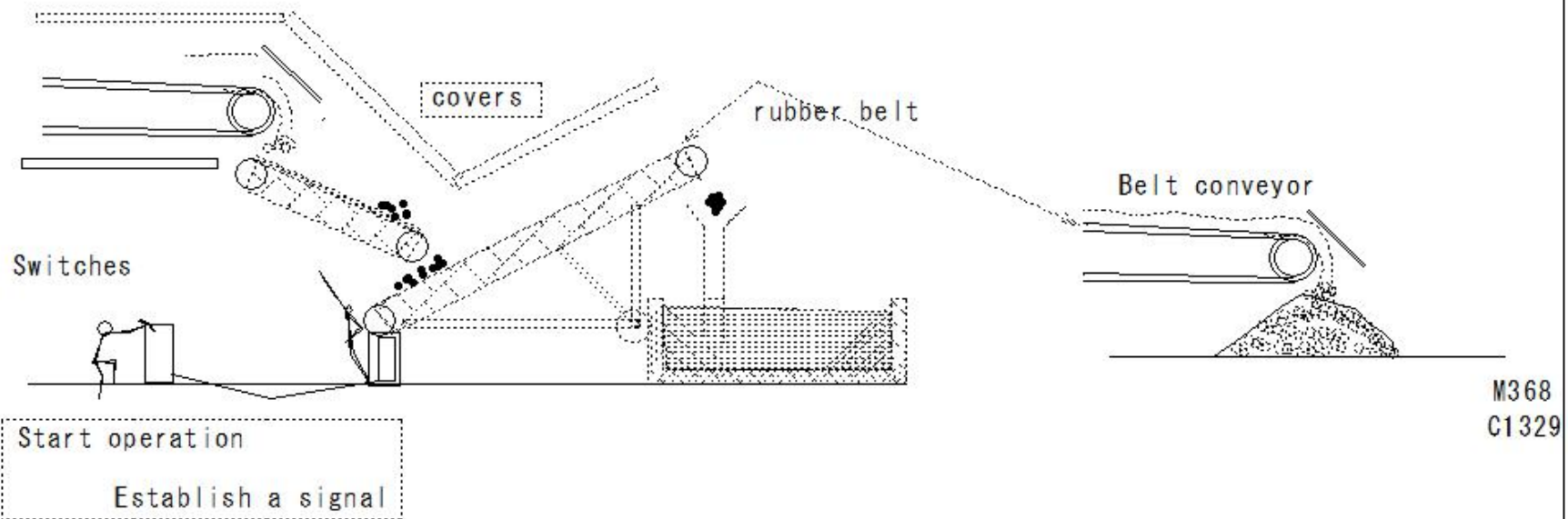
(S332)General standards for machinery

(S332)General standards for machinery

General standards for machinery

Signal to start operation

When starting operation of a machine, a certain signal must be established
and a person must be appointed to give the signal



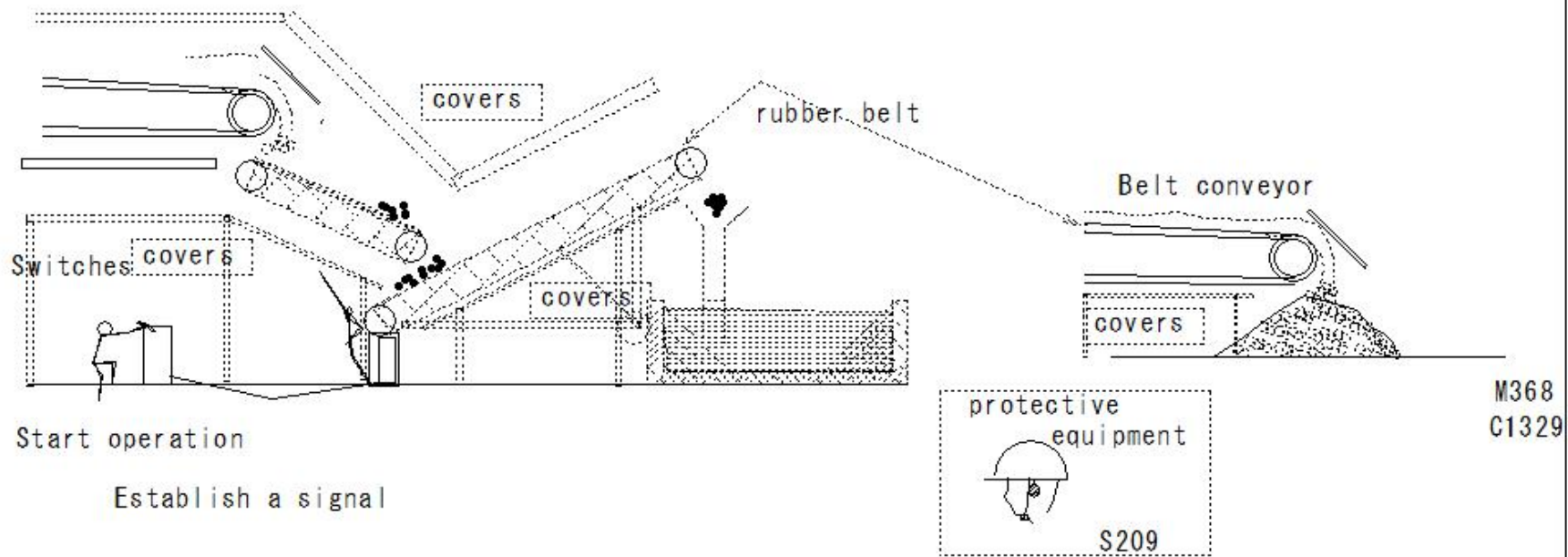
(S333)General standards for machinery

(S333)General standards for machinery

General standards for machinery

Prevention of dangers caused by flying workpieces, etc.

Provide covers or enclosures, or have workers use protective equipment



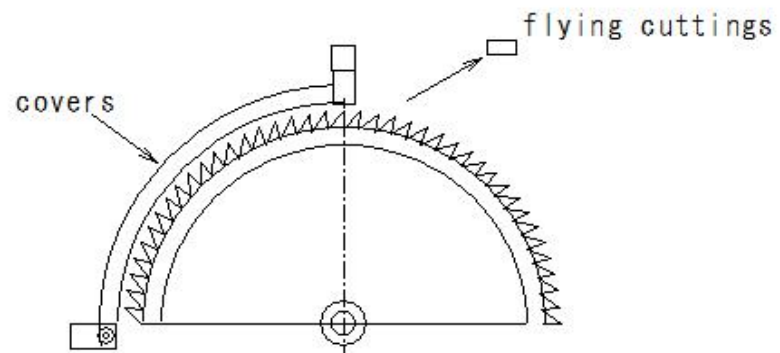
(S334)General standards for machinery

(S334) General standards for machinery

General standards for machinery

Prevention of dangers caused by flying cuttings, etc.

Provide covers or enclosures, or have workers use protective equipment



(S335)General standards for machinery

(S335)General standards for machinery

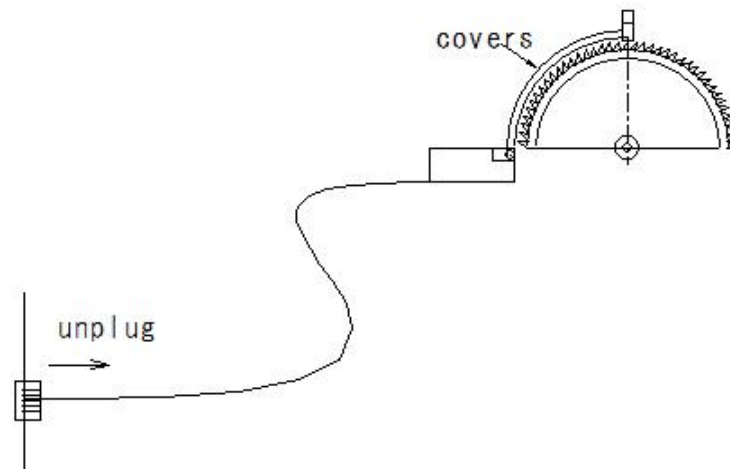
General standards for machinery

Stopping operation when cleaning the blade, etc.

Install a cover or enclosure, or have workers use protective equipment

Stop operation and unplug the power cord when cleaning the blade of a drill press,
electric drill, etc., or when replacing, repairing, or adjusting the blade.

repairing



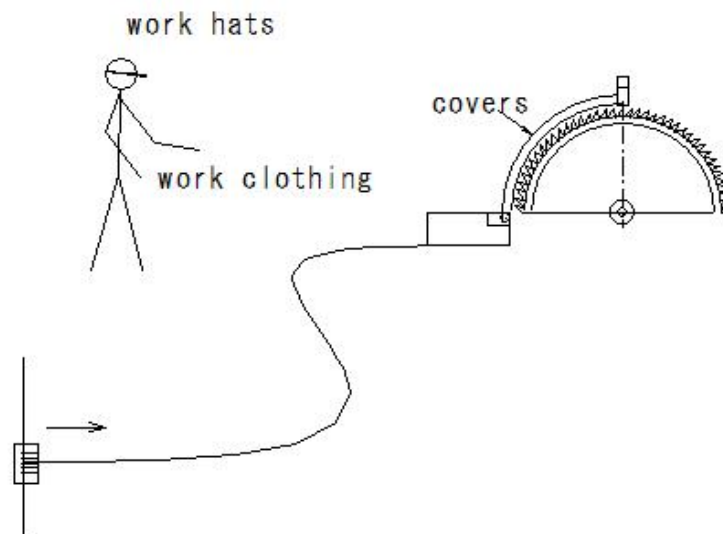
(S336)General standards for machinery

(S336)General standards for machinery

General standards for machinery

Wearing work hats, etc.

Wear appropriate work hats or clothing to prevent hair or clothing from getting caught.



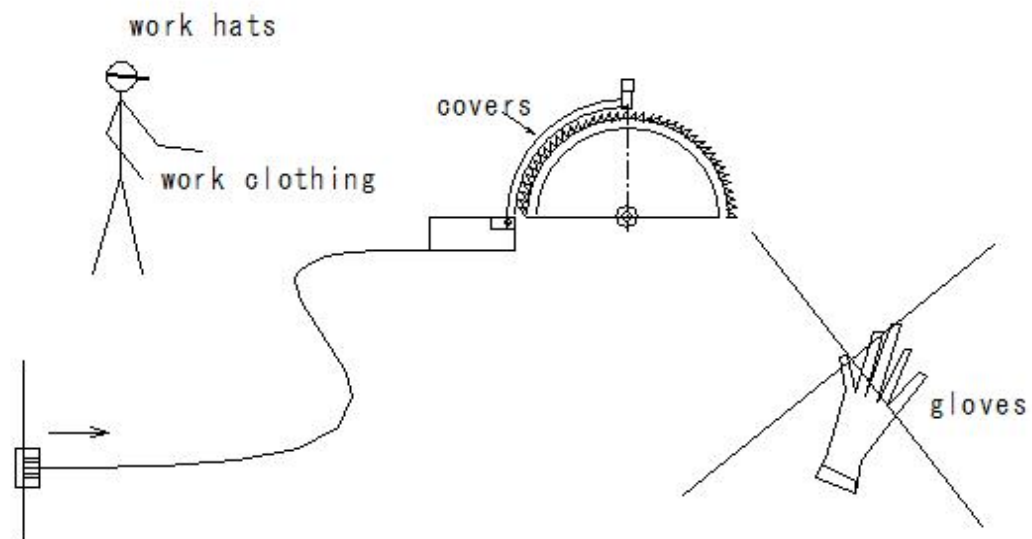
(S337)General standards for machinery

(S337)General standards for machinery

General standards for machinery

Do not use gloves

Work involving the risk of hands getting caught, such as drill presses and chamfering machines



(S338)Crane

(S338) Crane

Flowchart for crane notification, etc.

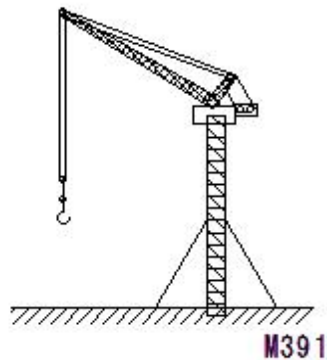
Chief of the local labor standards inspection office

Crane installation notification

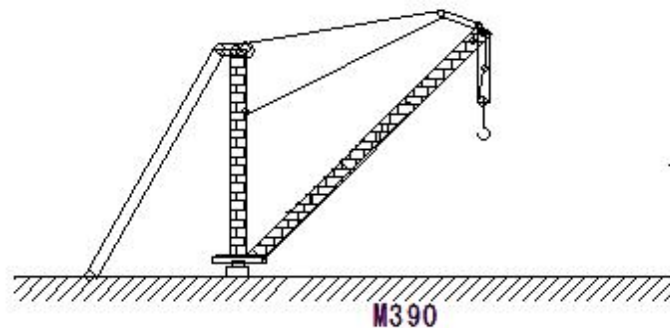
- Crane specifications
- Crane assembly diagram
- Structural part strength calculation sheet
- Surrounding conditions of the installation site
- Foundation overview
- Traveling range for traveling cranes

Crane installation report

tower crane



derrick crane

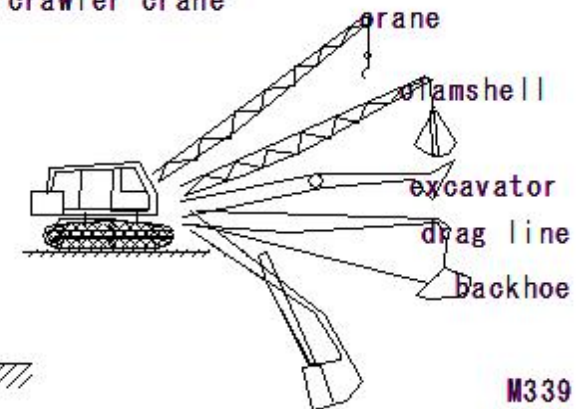


truck-crane



M393

crawler crane



M339

(S339)Crane

(S339) Crane

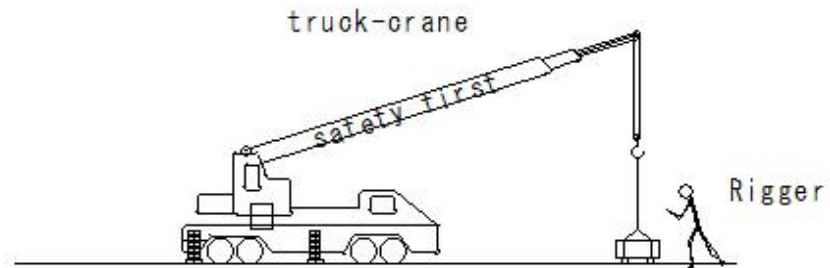
Crane safety work

Rigging work

Assignment of qualified personnel

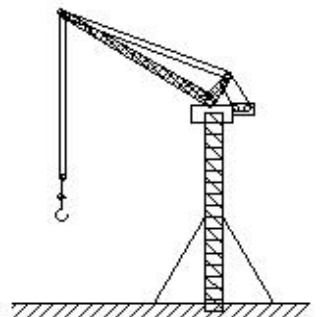
Employer

Rigger



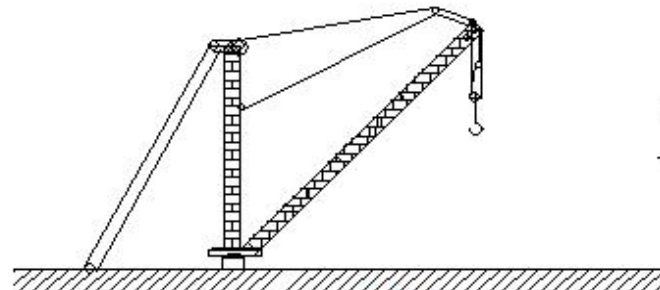
M393

tower crane



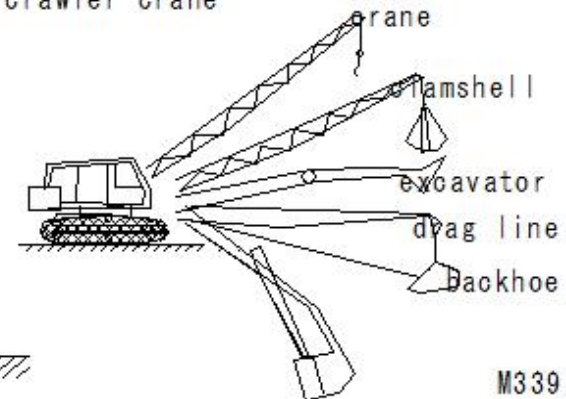
M391

derrick crane



M390

crawler crane



M339

(S340)Crane

Crane safety operations

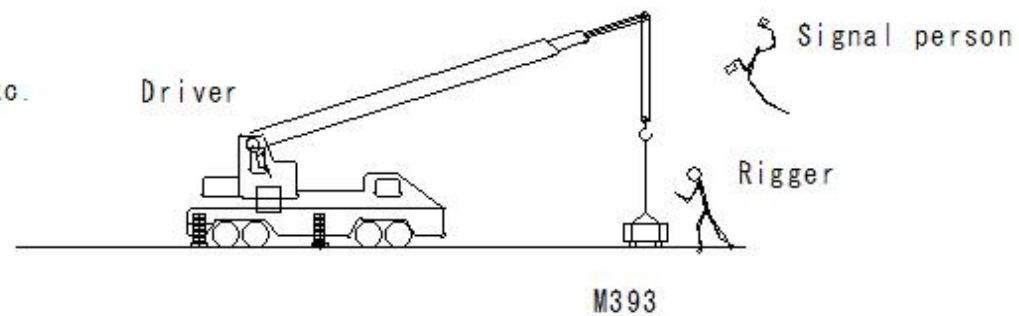
Crane

Designation: Operation signal

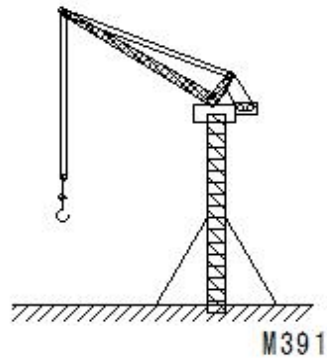
Signal person - driver, rigger, etc.

(S340) Crane

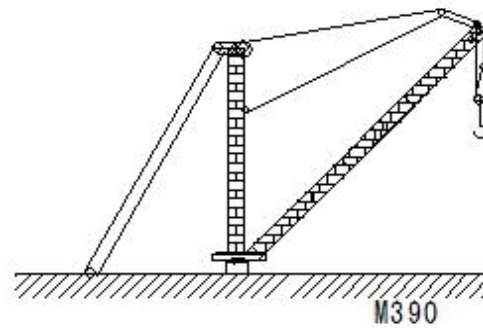
truck-crane



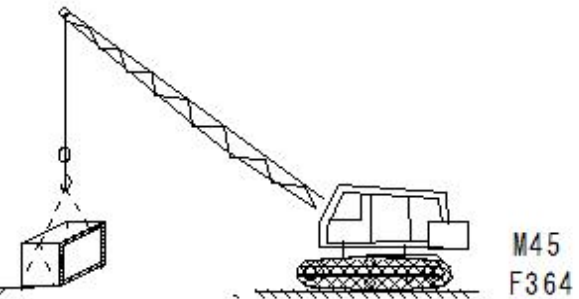
tower crane



derrick crane



Crawler crane



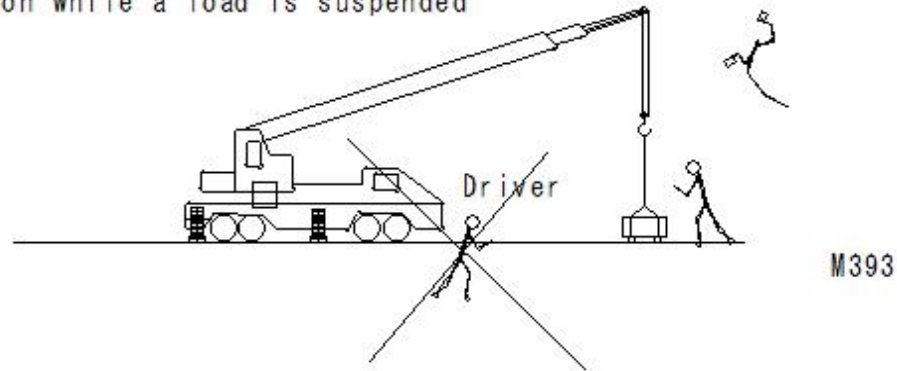
(S341)Crane

(S341) Crane

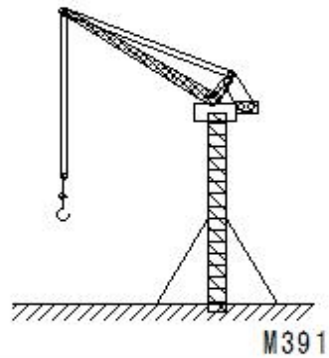
Safe crane operation

Do not leave the operating position while a load is suspended

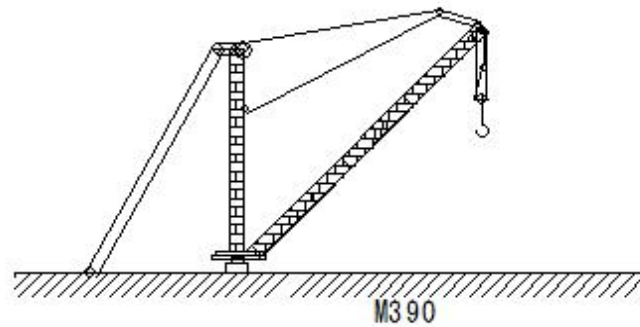
truck-crane



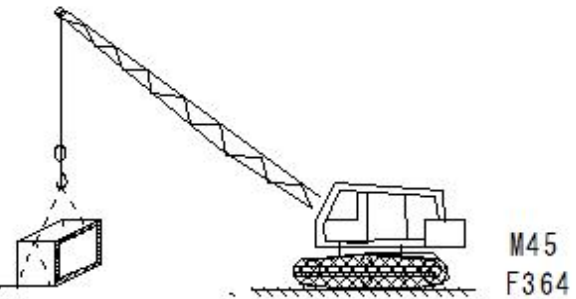
tower crane



derrick crane



Crawler crane



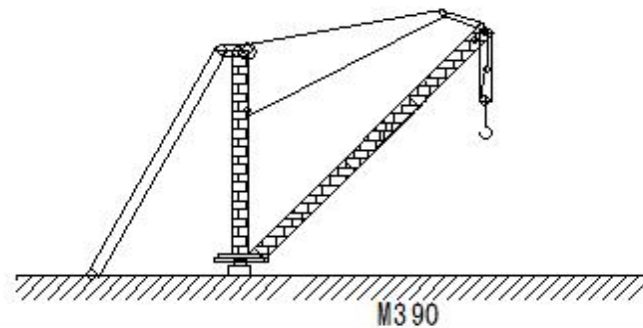
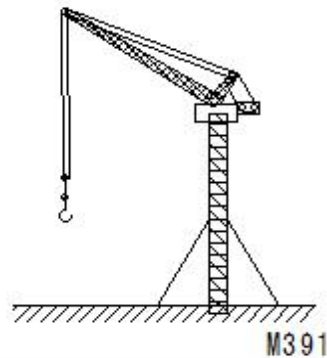
(S342) Crane

truck-crane

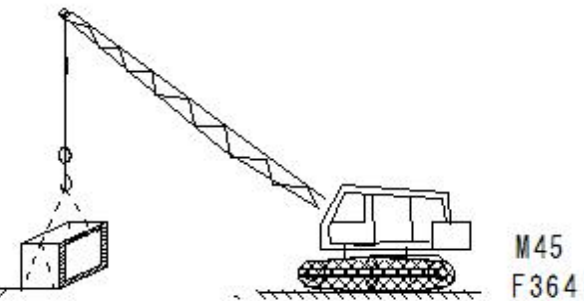
Duties

-
- (S342) Crane
- truck-crane
- assembly and dismantling work
- 1
- 2
- 3
- 4
- 5
- M393

derrick crane



Crawler crane



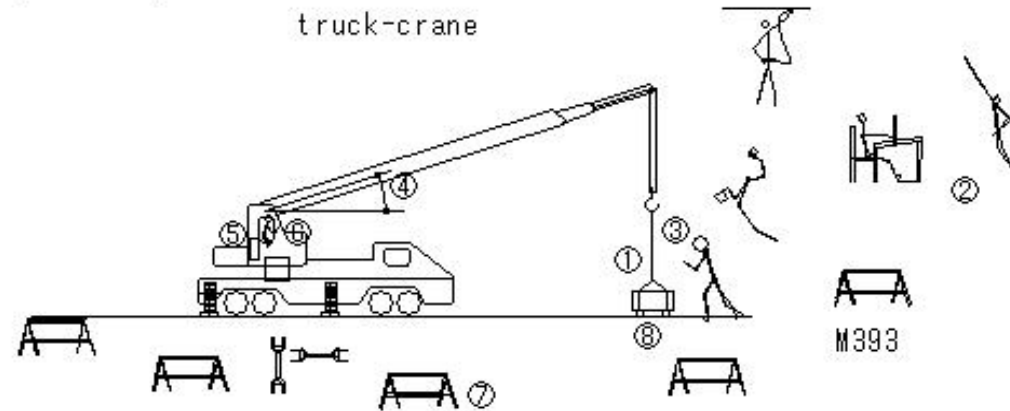
(S343)Crane

(S343)Crane

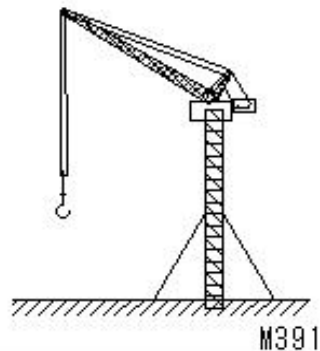
Crane safety operations

- ①Use of anti-slip devices
- ②Special training
- ③Overload restrictions
- ④Tilt angle restrictions
- ⑤Rated load display
- ⑥Boarding restrictions
- ⑦No entry
- ⑧No entry under suspended loads

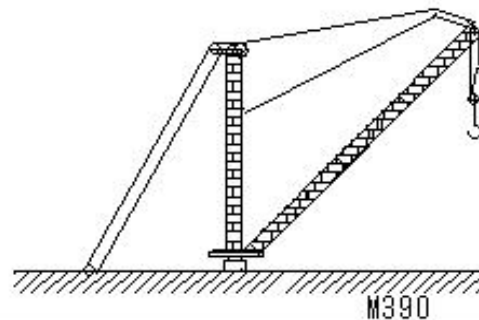
truck-crane



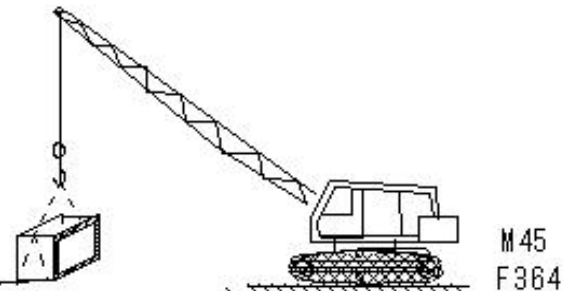
tower crane



derrick crane



Crawler crane

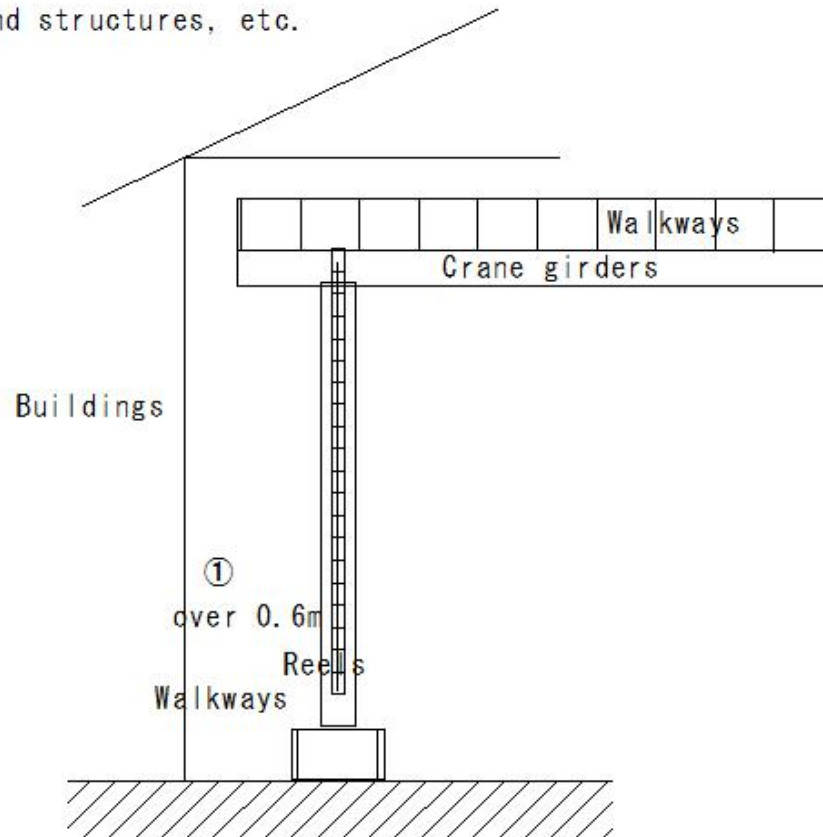


(S344)Crane management

(S344) Crane management

Crane management

- ① Distance between traveling cranes and structures, etc.

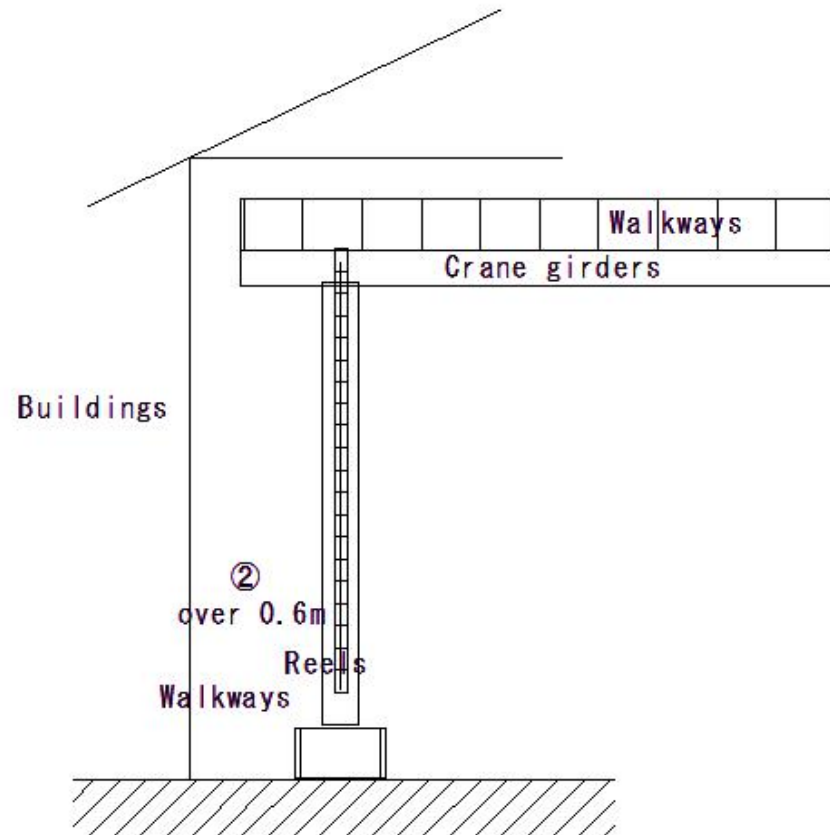


(S345)Crane management

(S345) Crane management

Crane management

- ② Walkways between structures, etc.

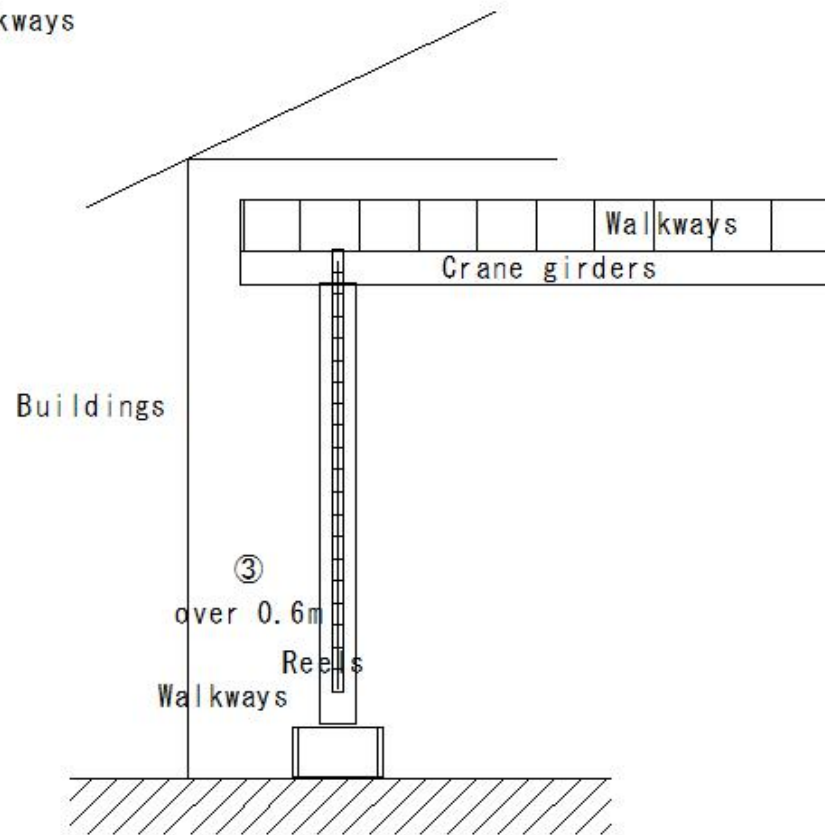


(S346)Crane management

(S346)Crane management

Crane management

- ③ Distance between cabs, etc. and walkways

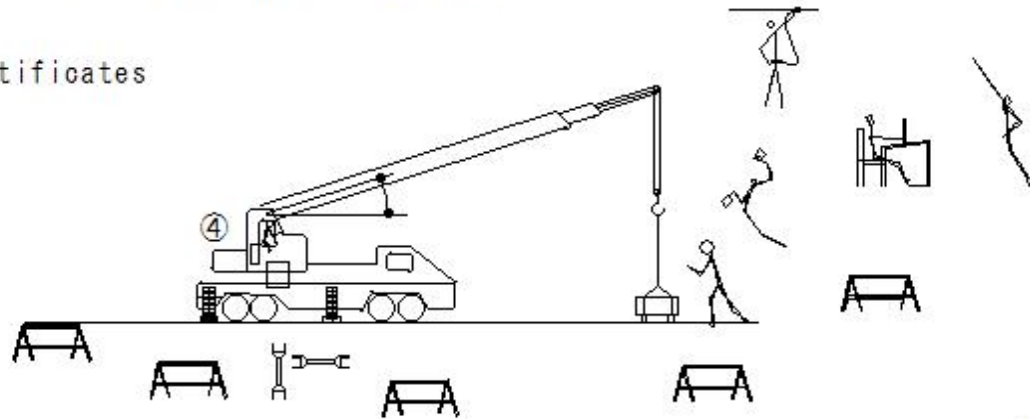


(S347)Crane management

(S347)Crane management

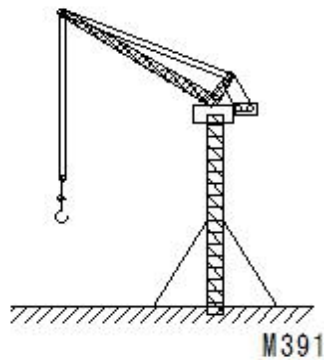
Crane management

④ Installation of inspection certificates



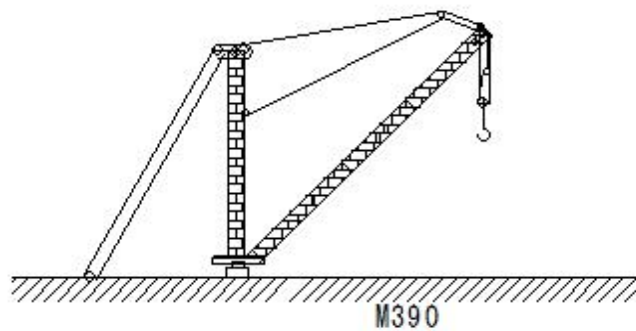
M393

tower crane



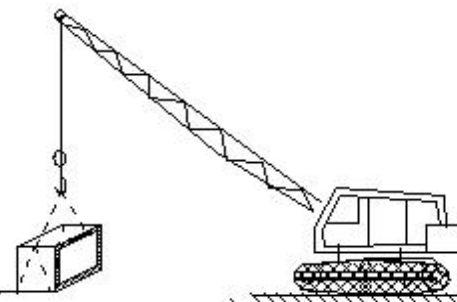
M391

derrick crane



M390

Crawler crane



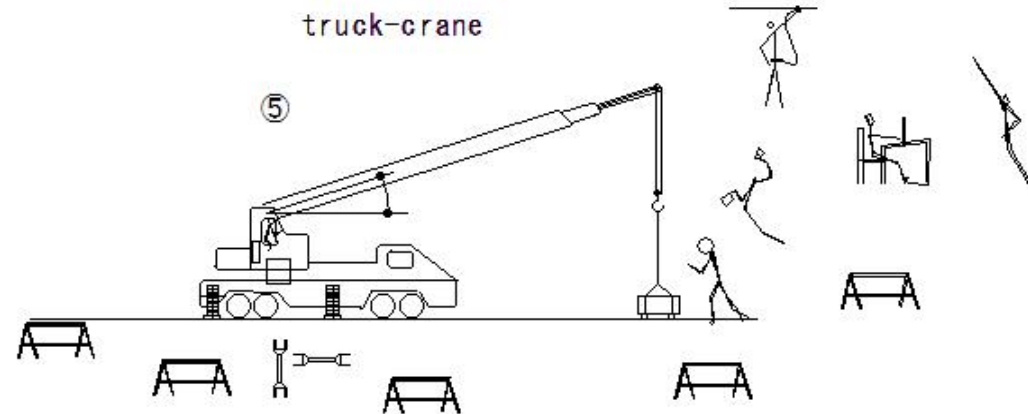
M45
F364

(S348)Crane management

(S348) Crane management

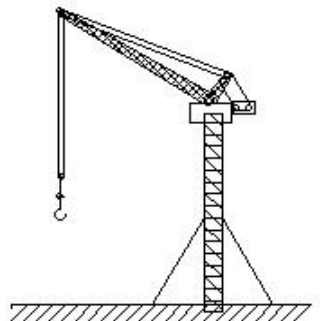
Crane management

⑤ Restrictions on use



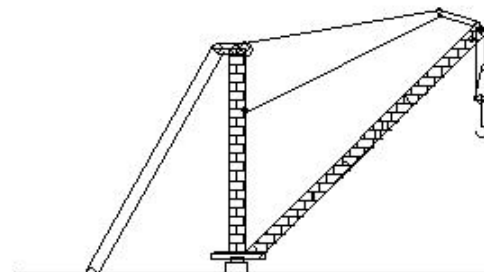
M393

tower crane



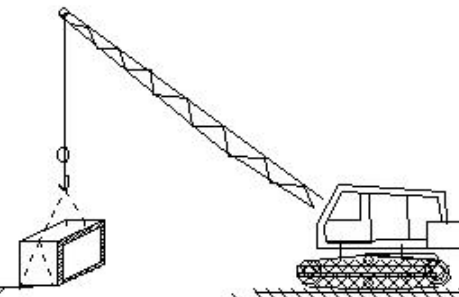
M391

derrick crane



M390

Crawler crane



M45
F364

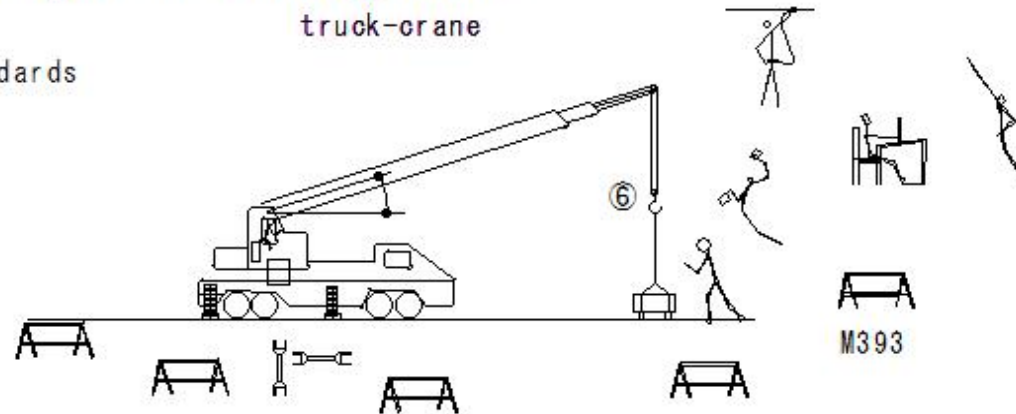
(S349)Crane management

(S349) Crane management

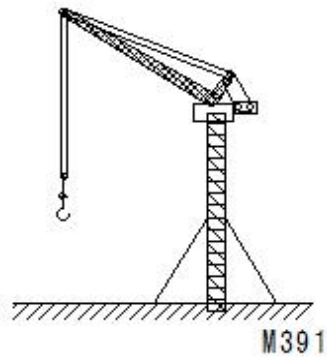
Crane safety operations

⑥ Load conditions as design standards

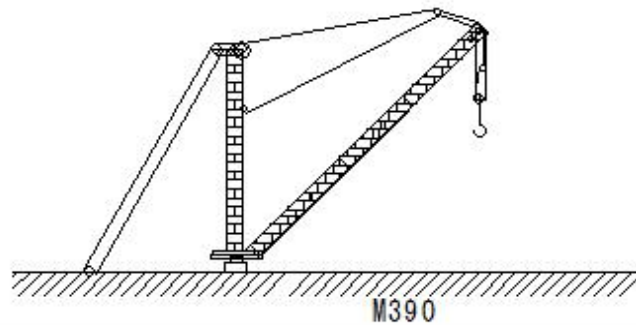
truck-crane



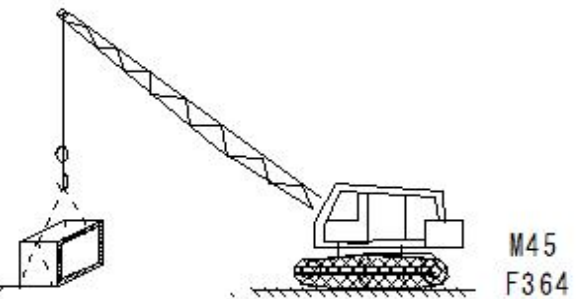
tower crane



derrick crane



Crawler crane



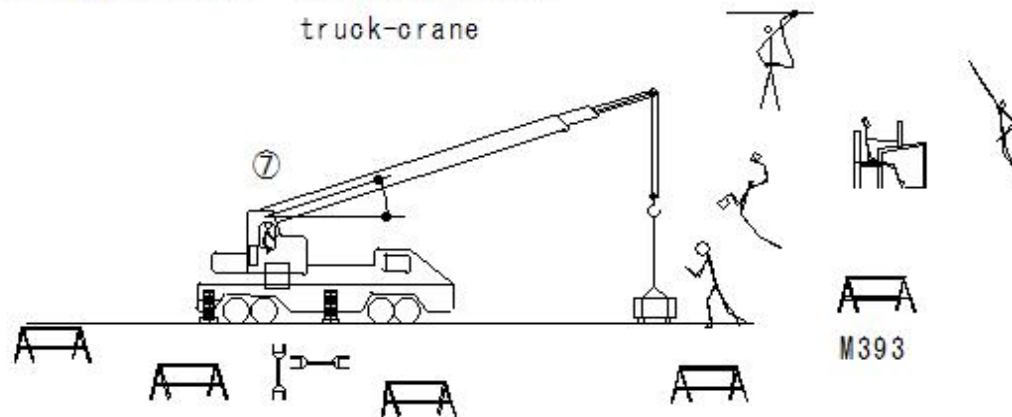
(S350)Crane management

(S350) Crane management

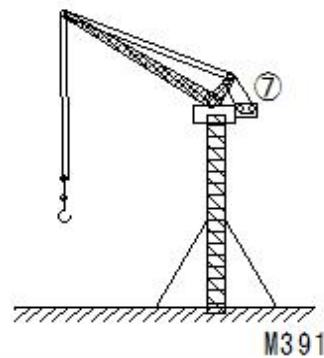
Crane safety operations

⑦ Prevention of vortices

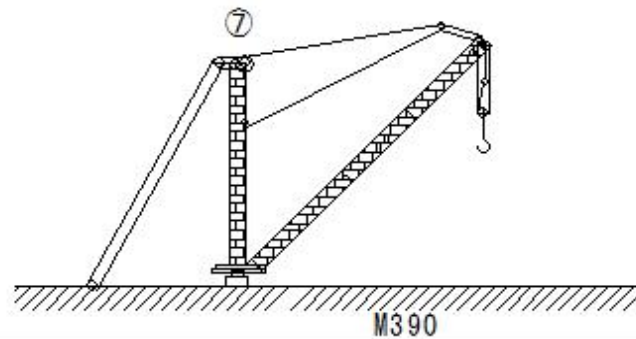
truck-crane



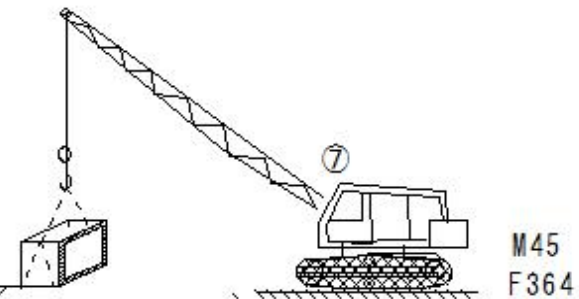
tower crane



derrick crane



Crawler crane



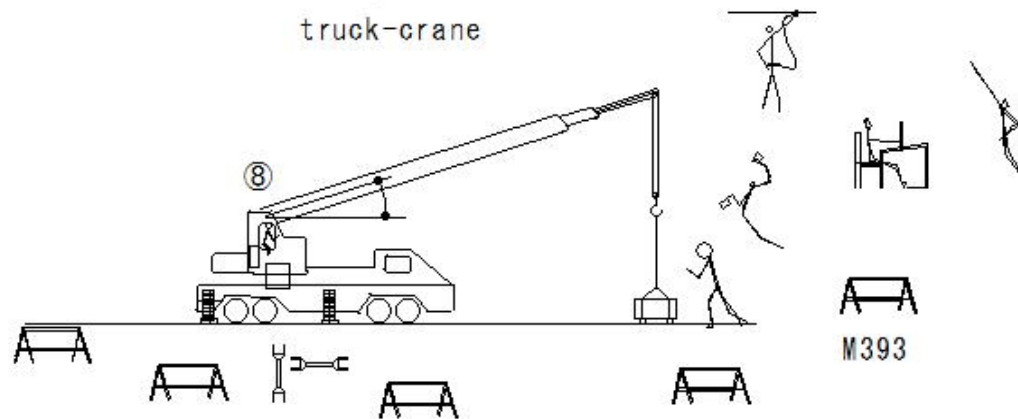
(S351)Crane management

(S351)Crane management

Crane safety operations

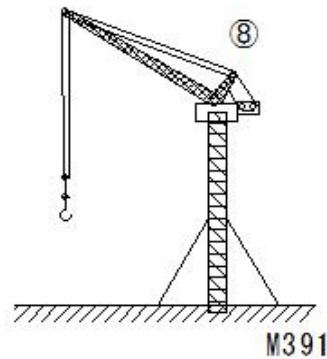
⑧ Adjustment of safety valves

truck-crane



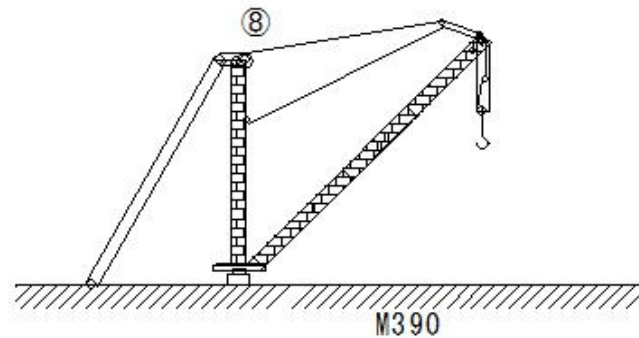
M393

tower crane



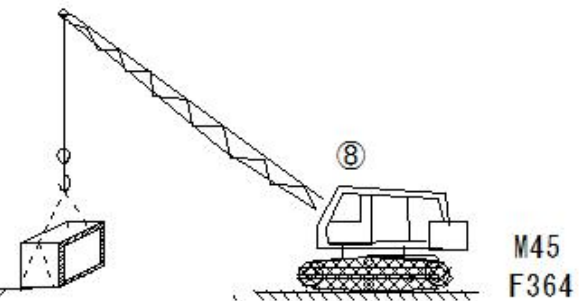
M391

derrick crane



M390

Crawler crane



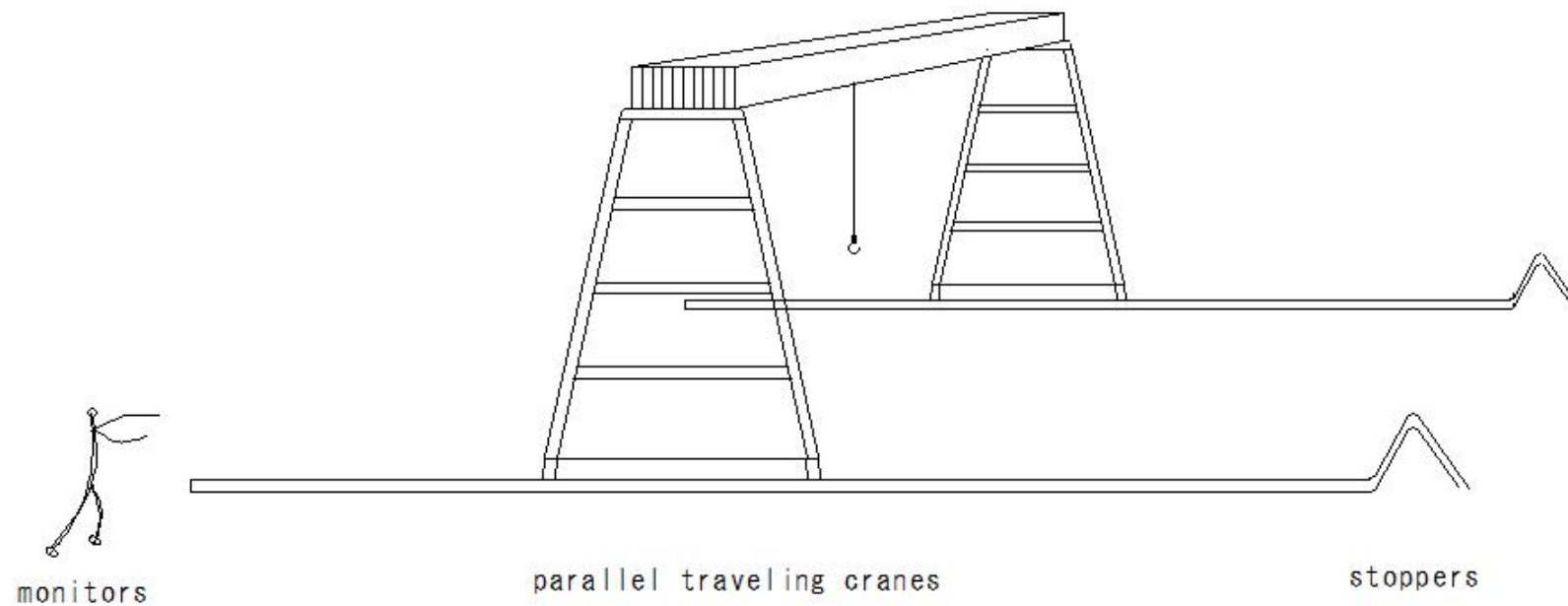
M45
F364

(S352)Crane management

(S352) Crane management

Crane management

- ⑨ Repair work for parallel traveling cranes
 - Measures such as monitors and stoppers



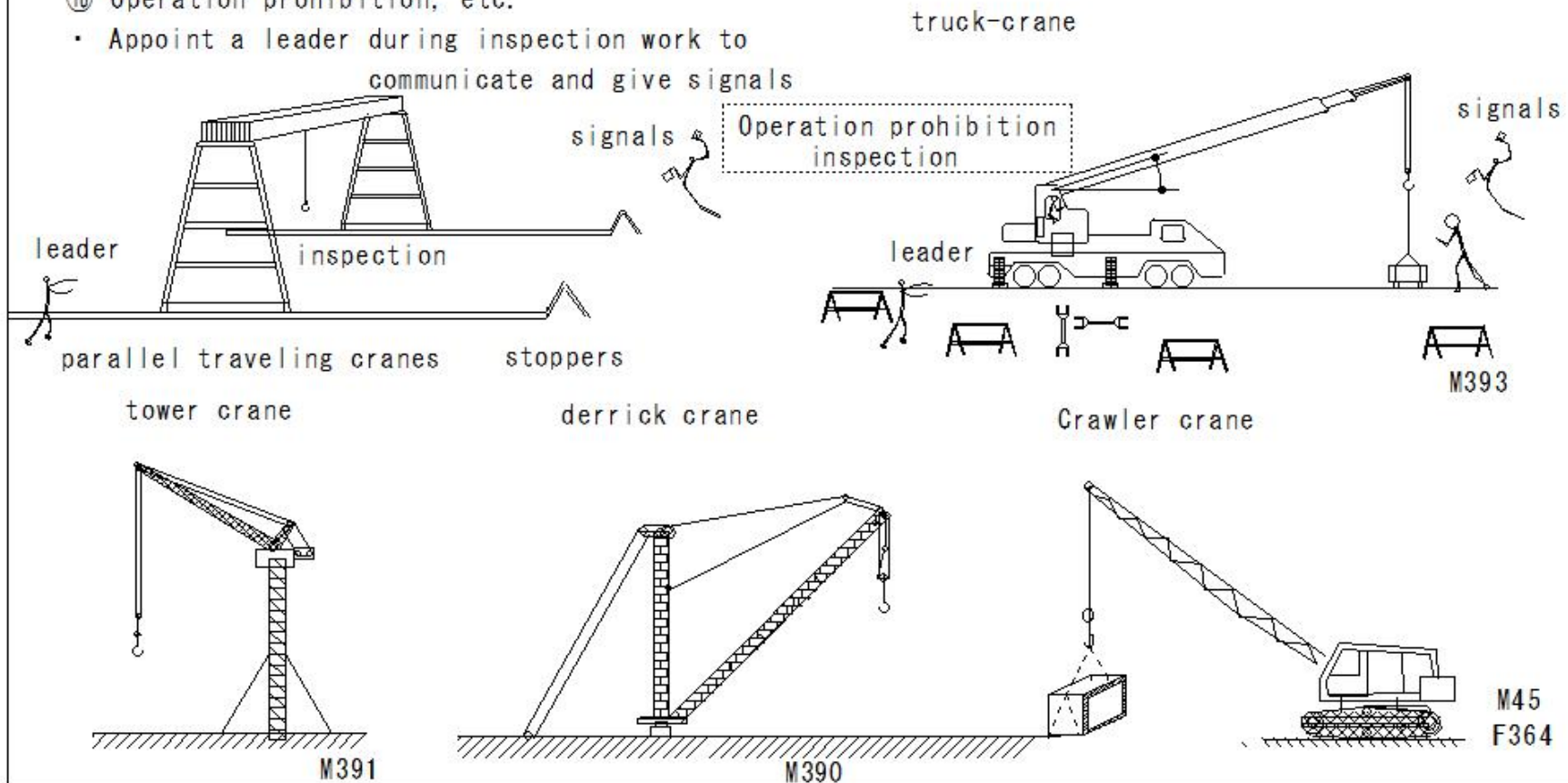
(S353)Crane management

(S353) Crane management

Crane safety operations

⑩ Operation prohibition, etc.

- Appoint a leader during inspection work to communicate and give signals



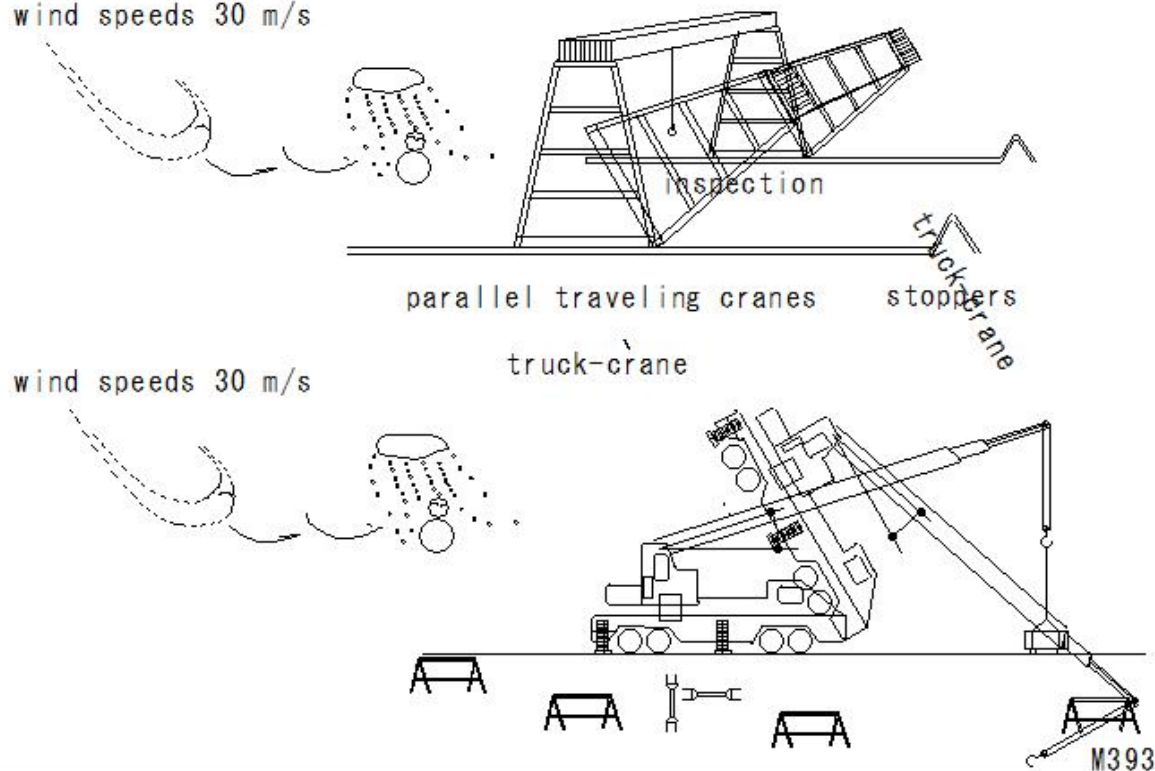
(S354)Crane management

(S354) Crane management

Crane safety operations

⑪ Prevention of runaway during storms

Wind protection: Winds with instantaneous wind speeds exceeding 30 m/s
wind speeds 30 m/s



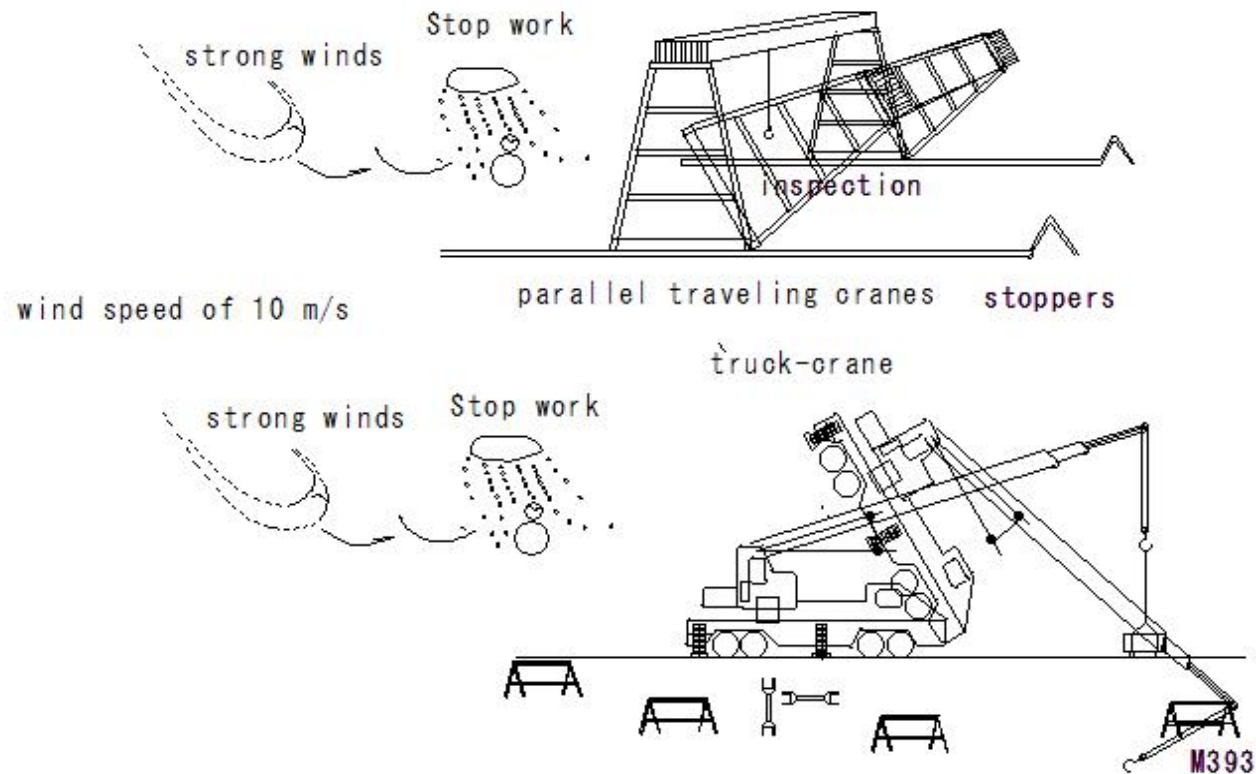
(S355)Crane management

(S355) Crane management

Crane safety operations

⑫ Stop work in strong winds

Strong winds: Winds with an average wind speed of 10 m/s or more over 10 minutes

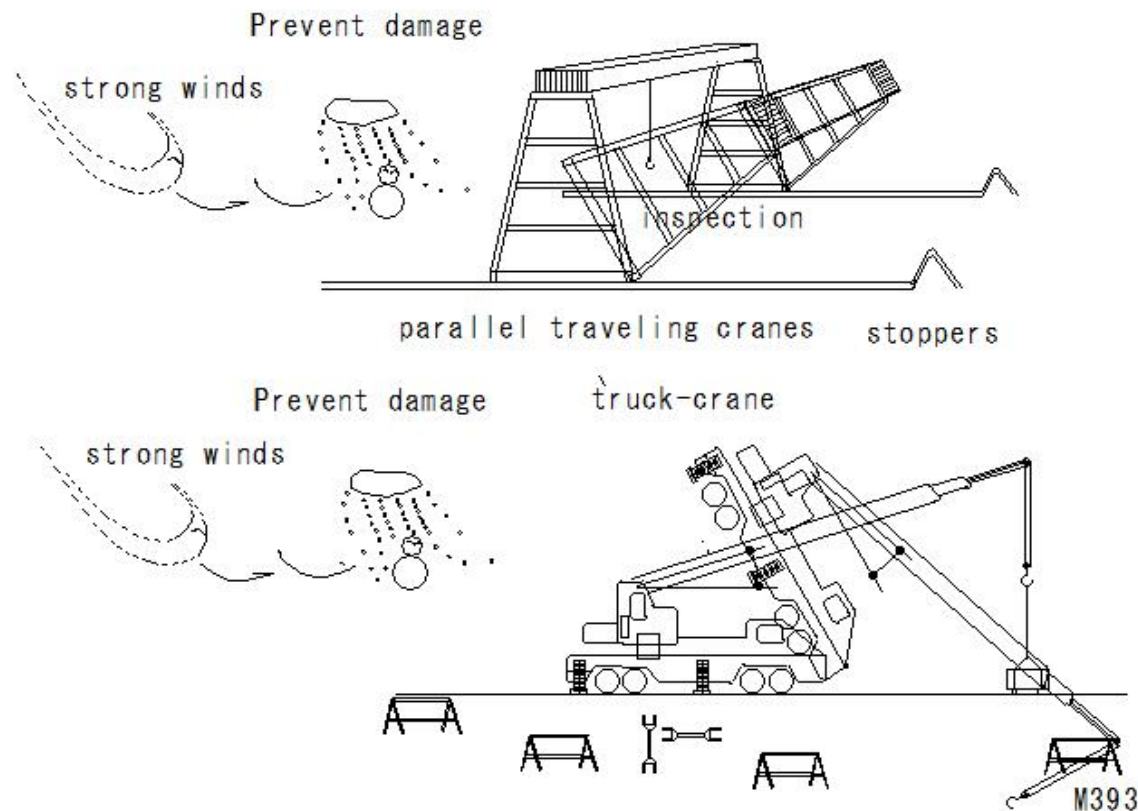


(S356)Crane management

(S356) Crane management

Crane safety operations

⑬ Prevent damage in strong winds



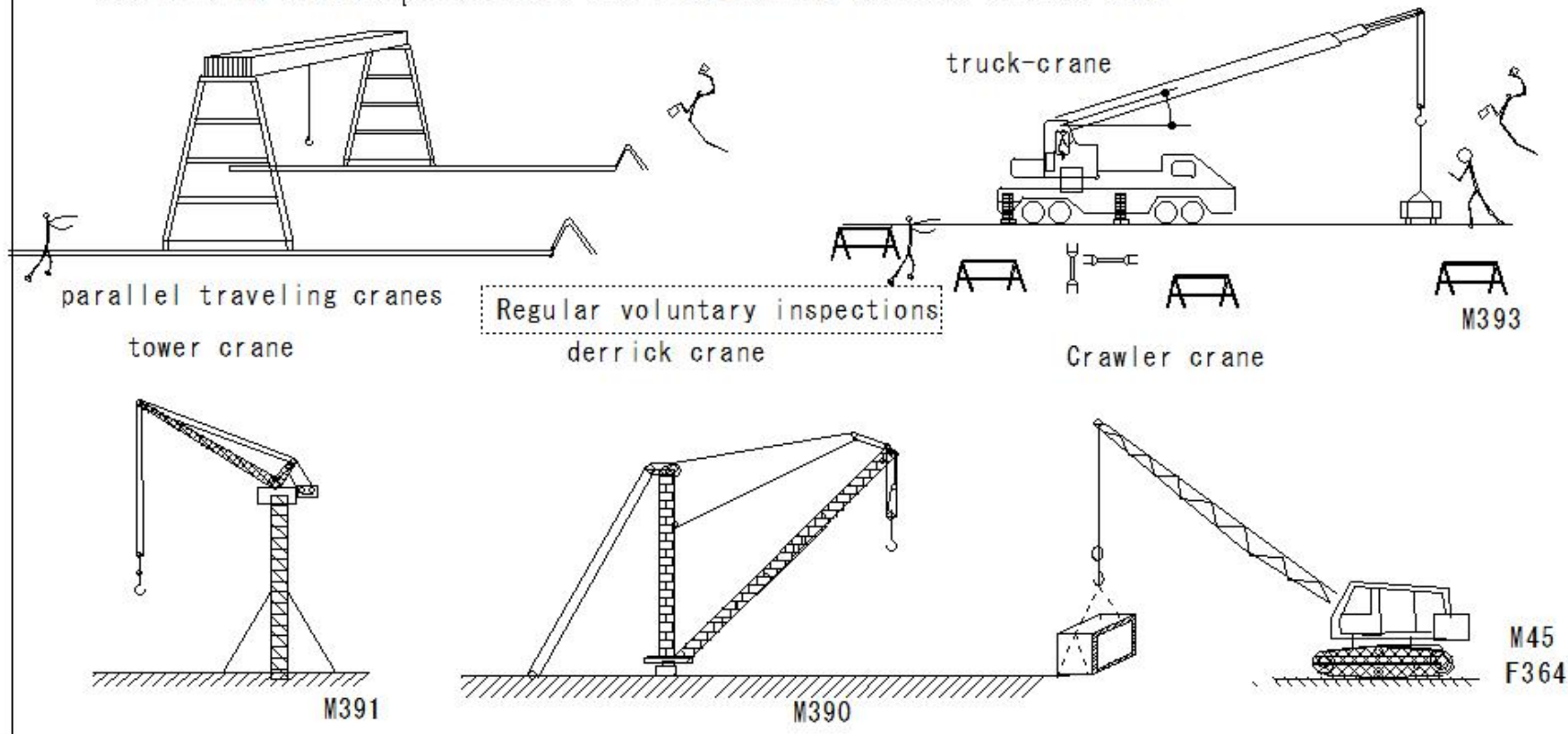
(S357)Crane management

Crane safety operations

⑭ Regular voluntary inspections

- Once per year • Once per month
- Overwinding prevention devices, overload warning devices, brakes, etc.

(S357) Crane management



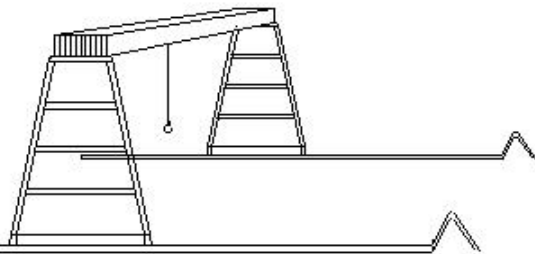
(S358)Crane management

(S358) Crane management

Crane safety operations

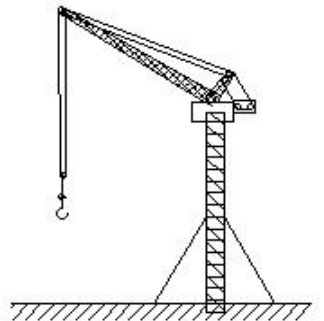
⑮ Inspection before starting work

Inspection before starting work



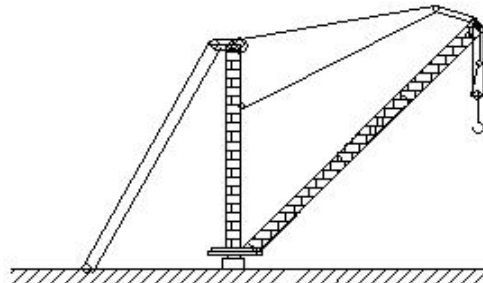
parallel traveling cranes

tower crane



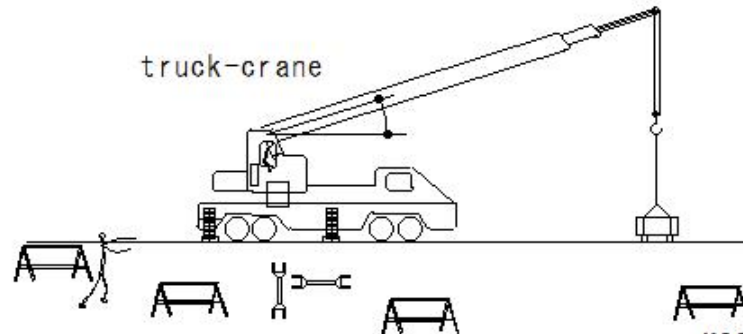
M391

derrick crane



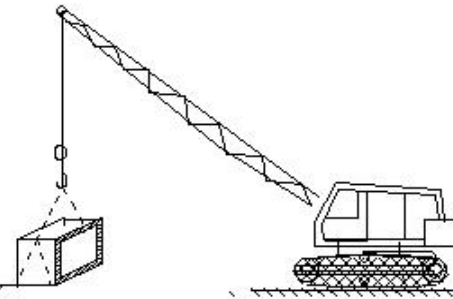
M390

truck-crane



M393

Crawler crane



M45
F364

(S359)Crane management

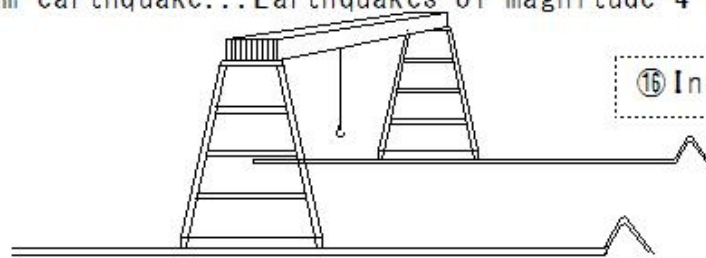
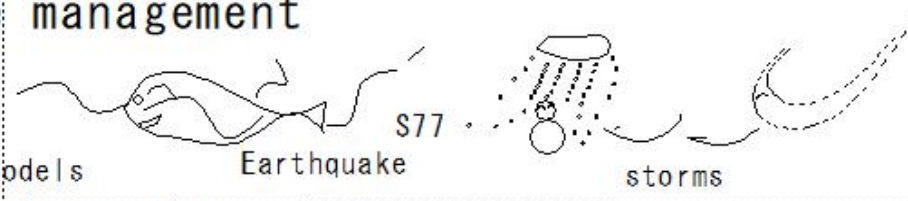
(S359) Crane management

Crane safety operations

⑮ Inspection after storms, etc.

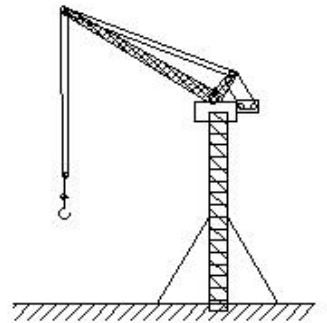
- After storms...Outdoor cranes only
- Medium earthquake or greater...All crane models

Medium earthquake...Earthquakes of magnitude 4 or greater



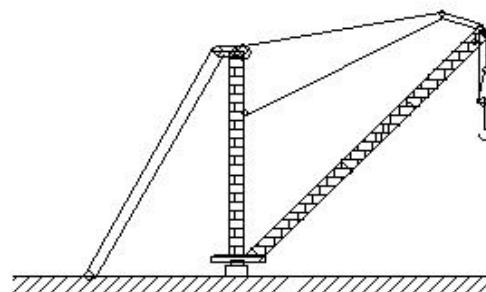
parallel traveling cranes

tower crane

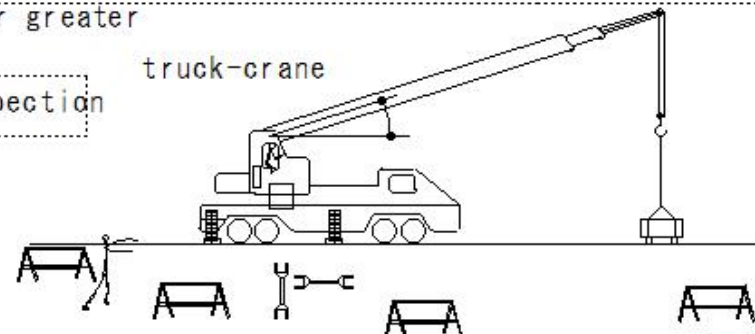


M391

derrick crane

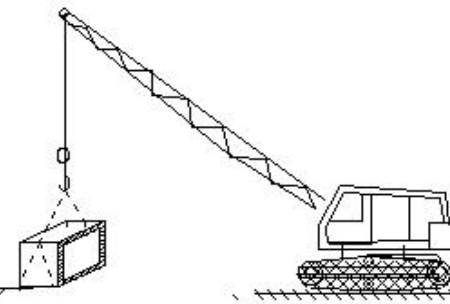


M390



truck-crane

Crawler crane



M45
F364

⑮ Inspection

M393

(S360)Crane management

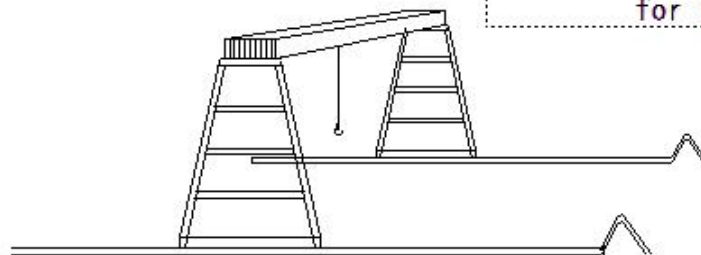
(S360)Crane management

Crane safety operations

⑦ Records of voluntary inspections, etc.

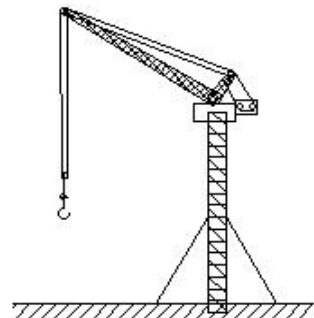
- Inspection records are kept for 3 years

⑦ Records of inspections
for 3 years



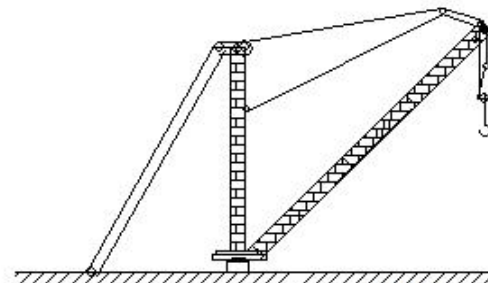
parallel traveling cranes

tower crane

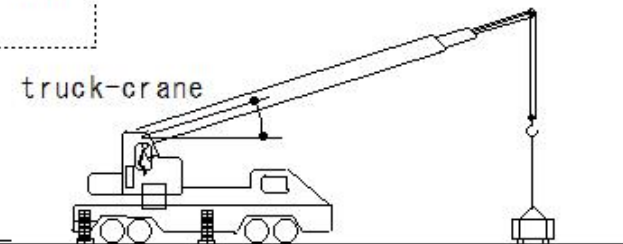


M391

derrick crane



M390

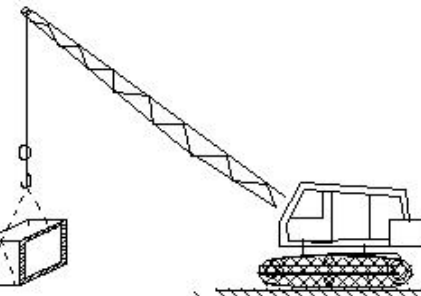


truck-crane



M393

Crawler crane



M45
F364

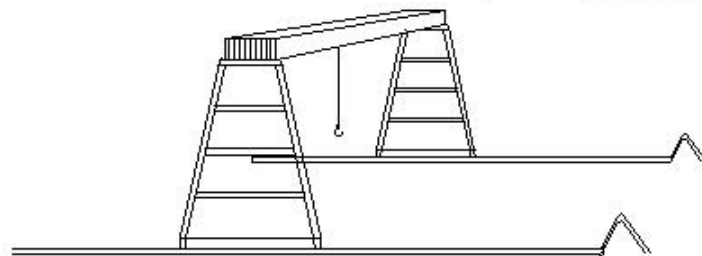
(S361)Crane management

(S361)Crane management

Crane safety operations

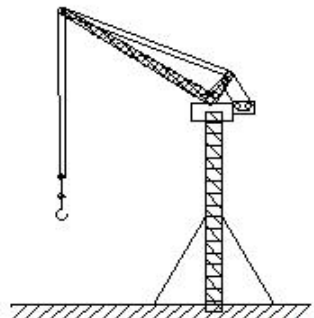
⑱ Repairs

⑱ Repairs



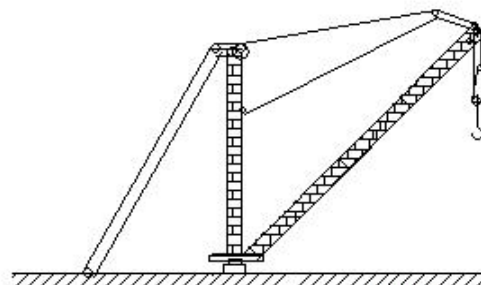
parallel traveling cranes

tower crane

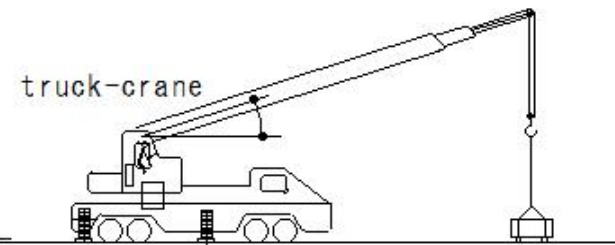


M391

derrick crane



M390

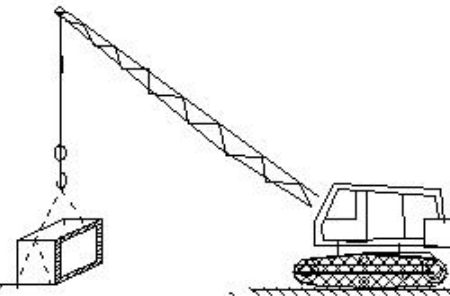


truck-crane



M393

Crawler crane



M45
F364

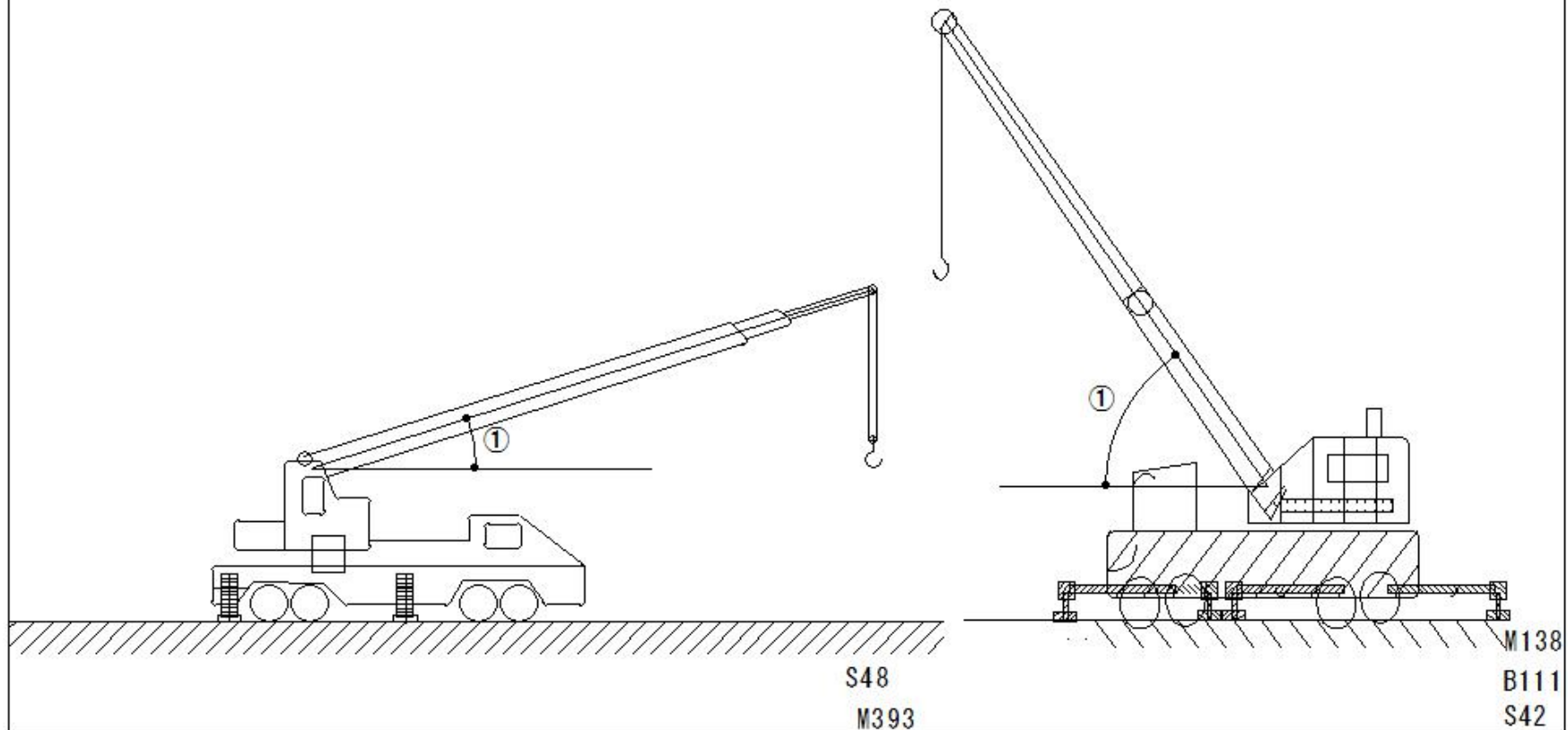
(S362)Mobile crane safety operations

(S362)Mobile crane safety operations

Mobile crane safety operations

① Tilt angle restrictions

truck crane



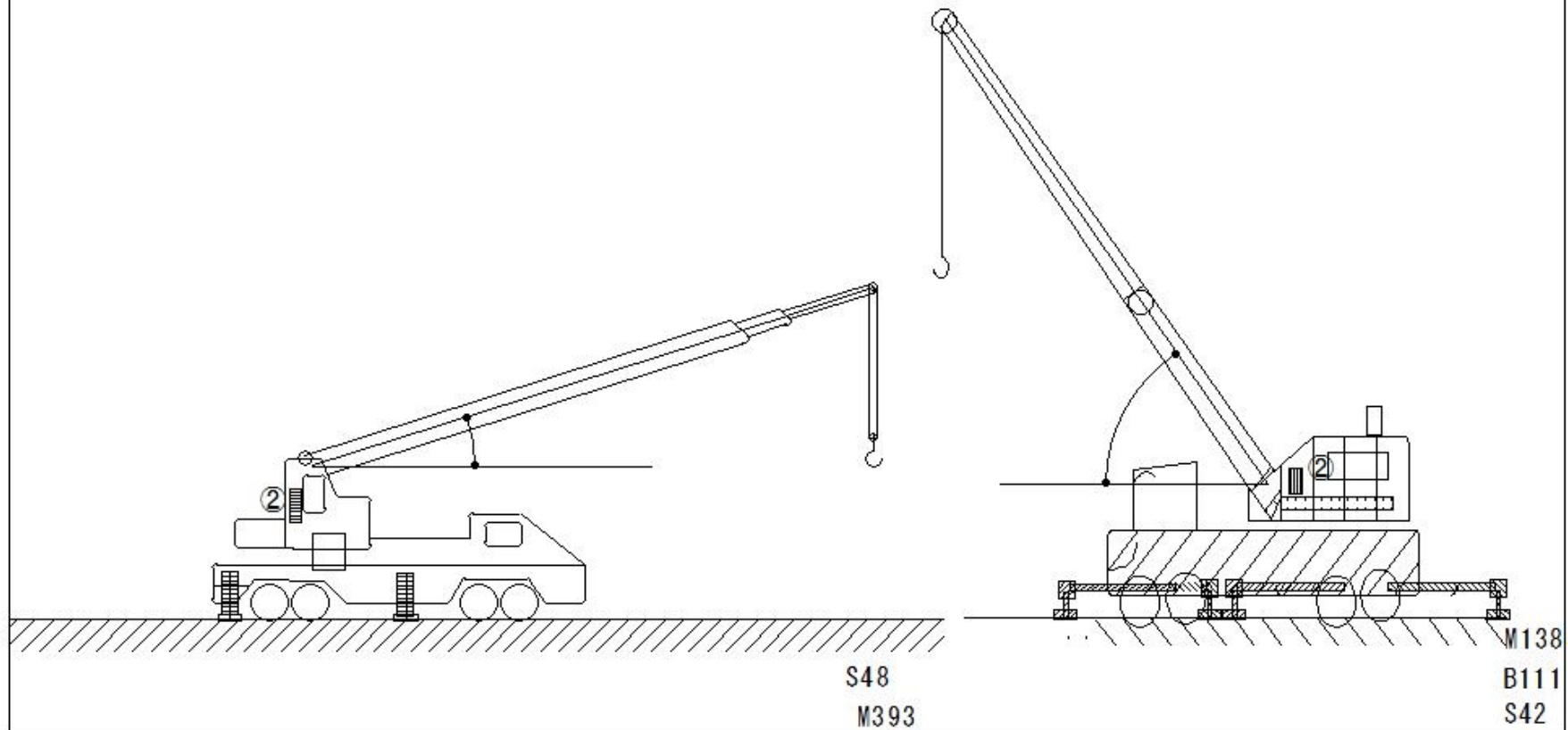
(S363)Mobile crane safety operations

(S363)Mobile crane safety operations

Mobile crane safety operations

② Load rating display, etc.

truck crane



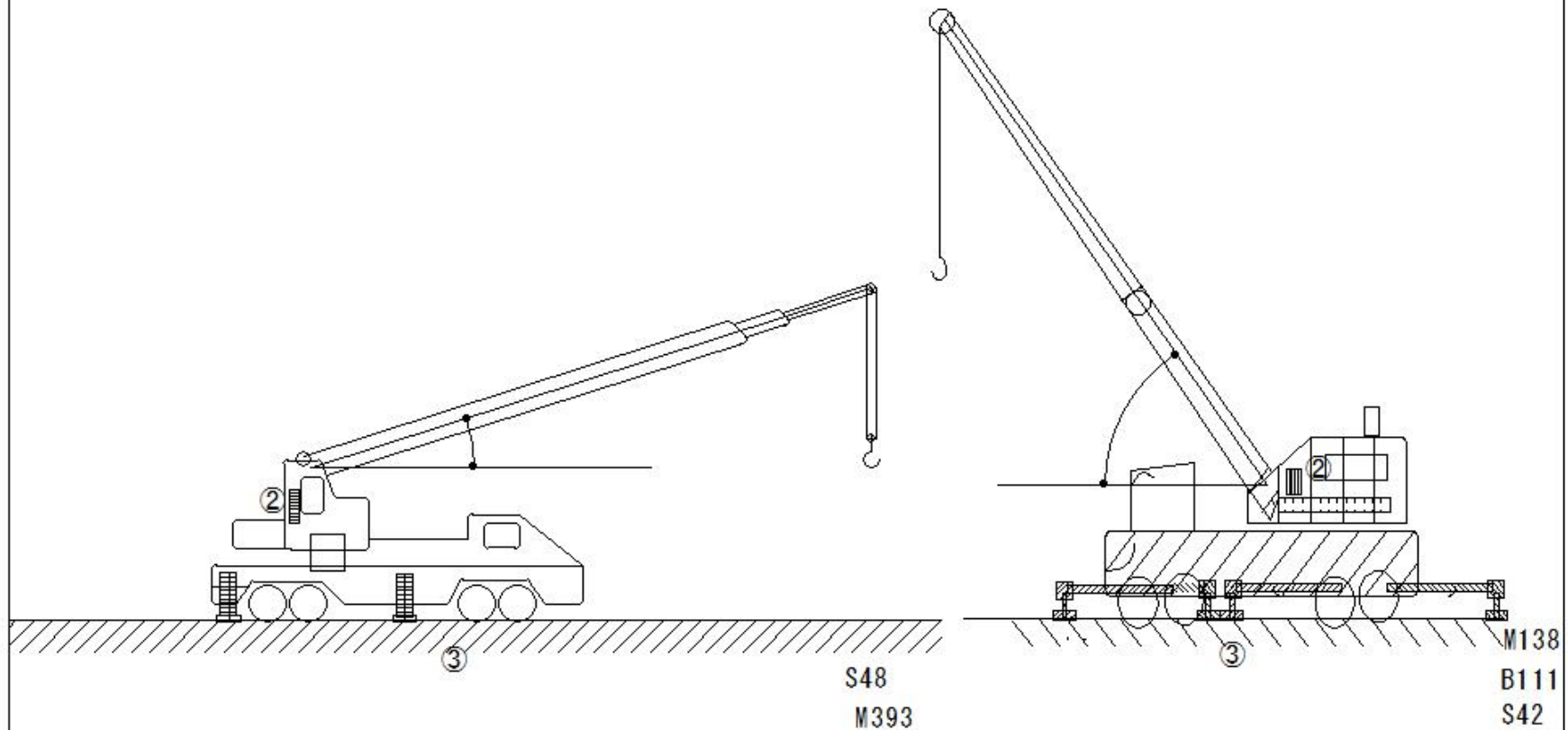
(S364) Mobile crane safety operations

(S364) Mobile crane safety operations

Mobile crane safety operations

- ③ Do not use on soft ground, etc.

truck crane

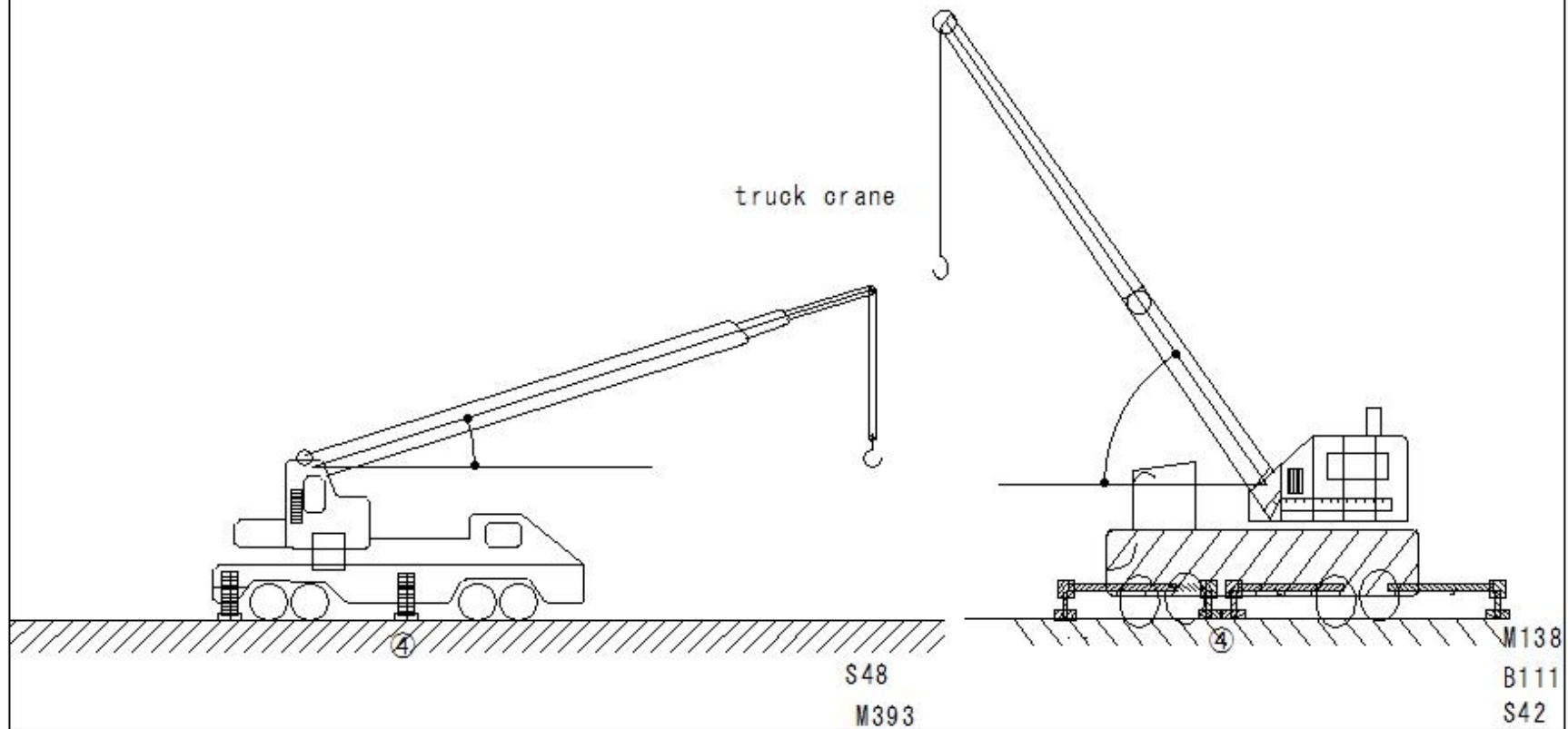


(S365) Mobile crane safety operations

(S365) Mobile crane safety operations

Mobile crane safety operations

④ Outrigger position

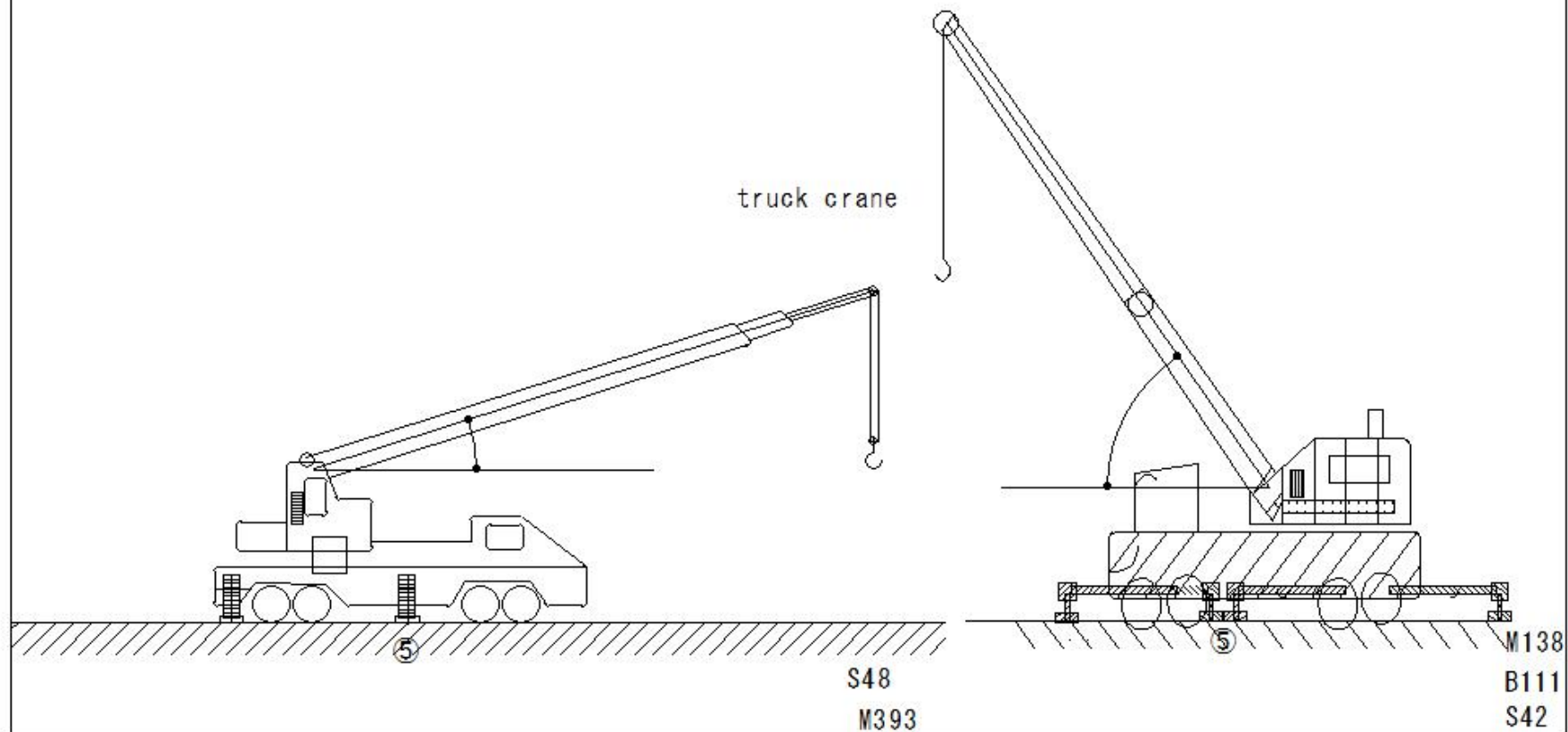


(S366)Mobile crane safety operations

(S366)Mobile crane safety operations

Mobile crane safety operations

⑤ Extending outriggers



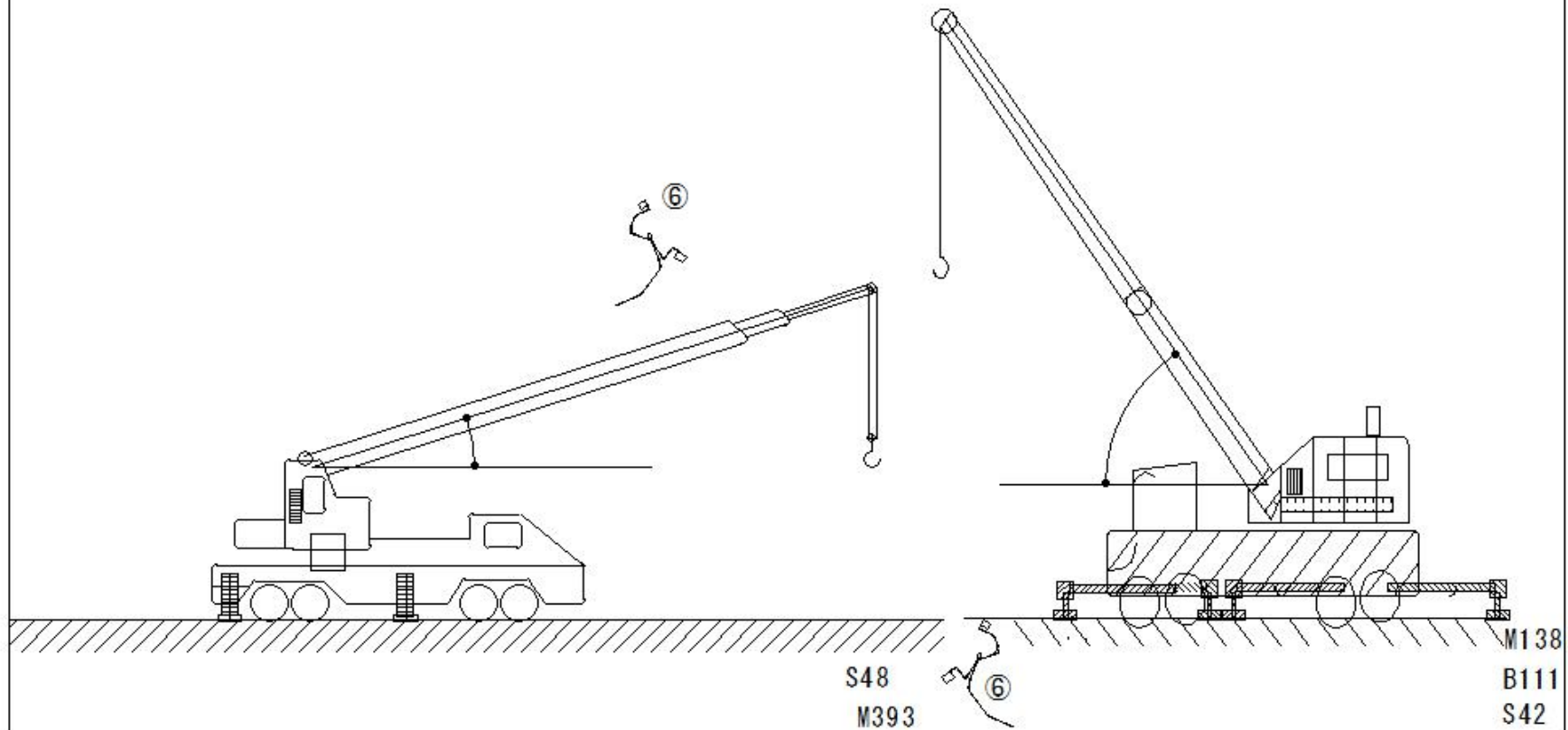
(S367)Mobile crane safety operations

(S367)Mobile crane safety operations

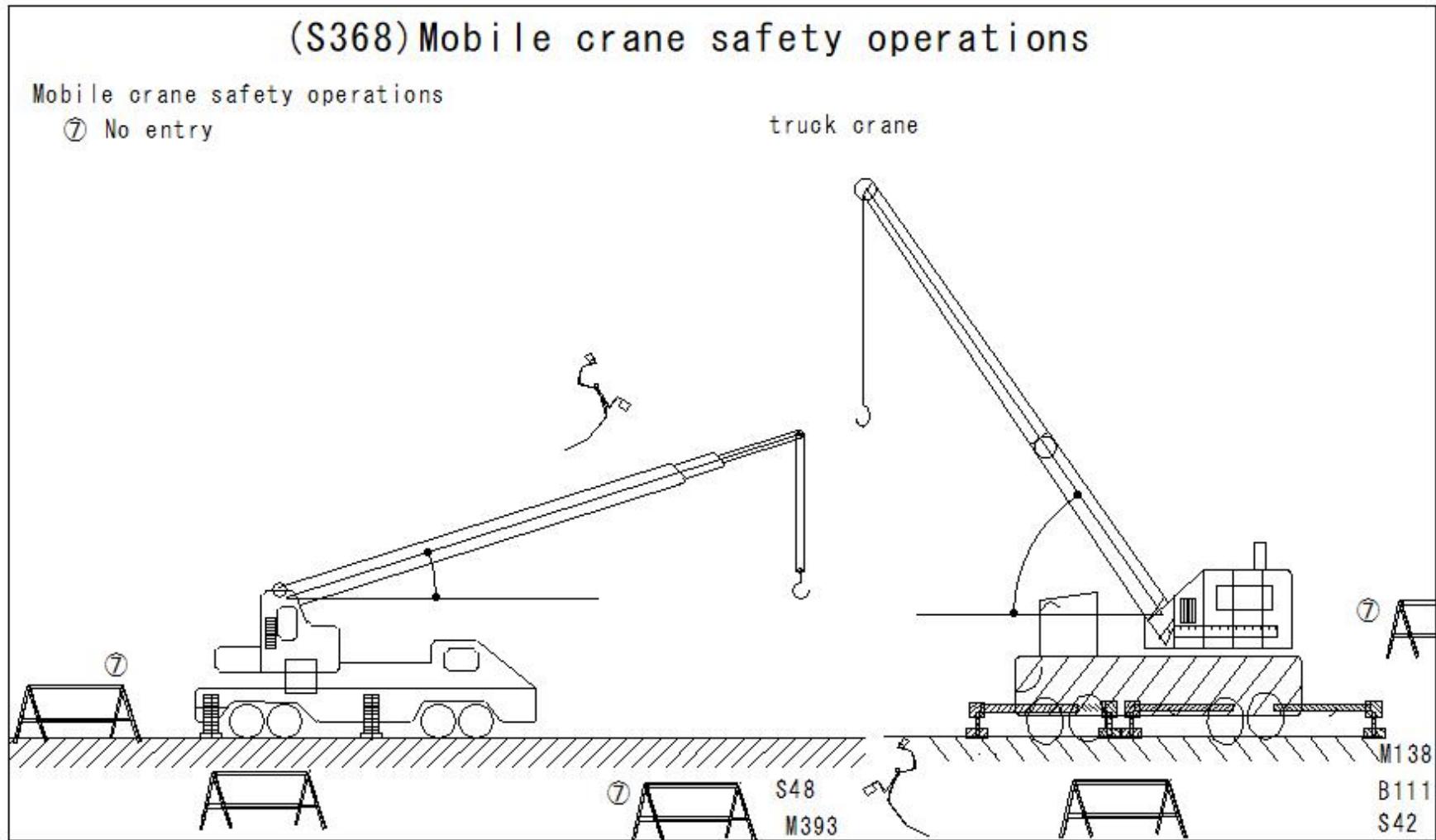
Mobile crane safety operations

⑥ Signals for operation

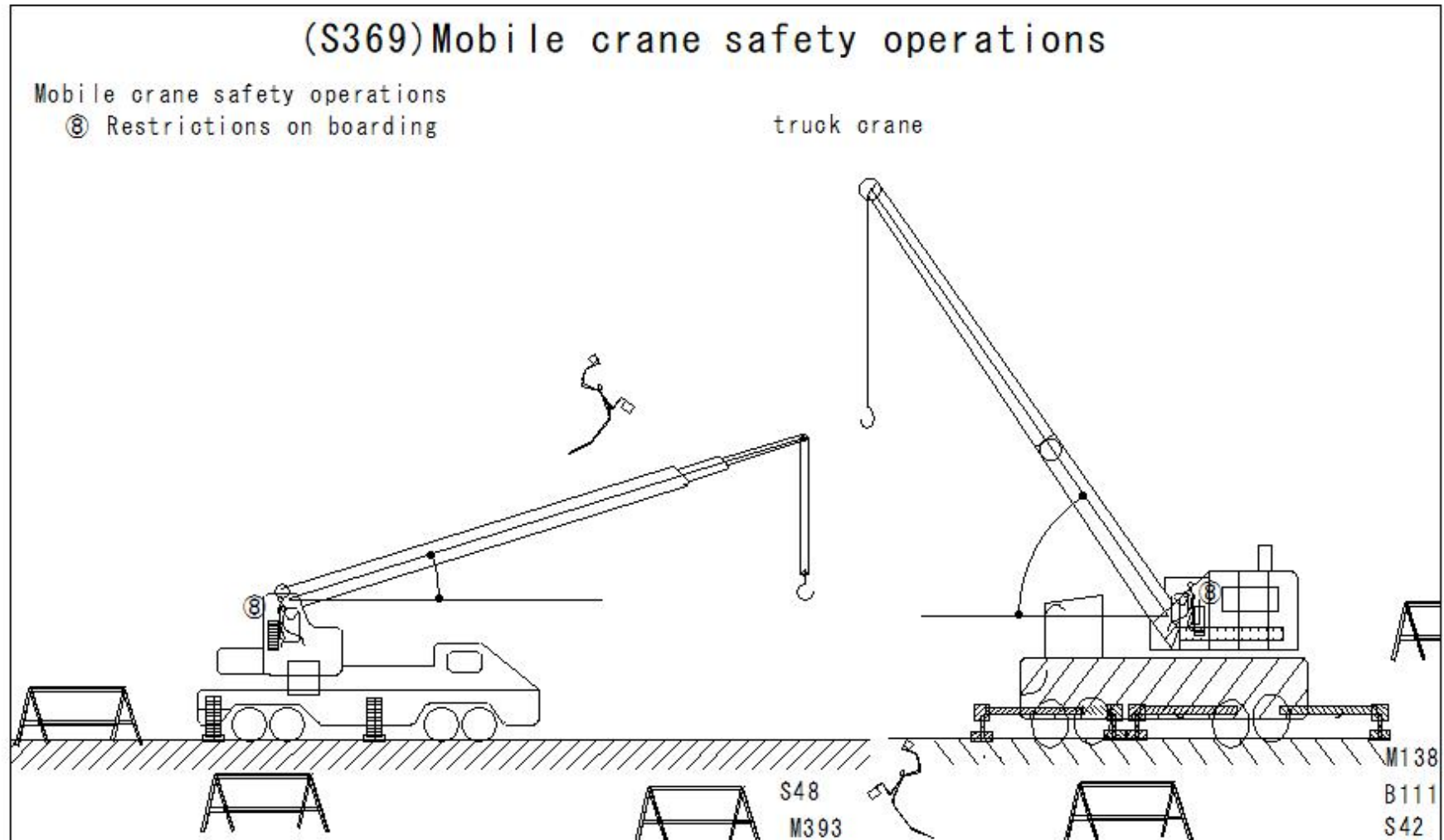
truck crane



(S368)Mobile crane safety operations



(S369)Mobile crane safety operations



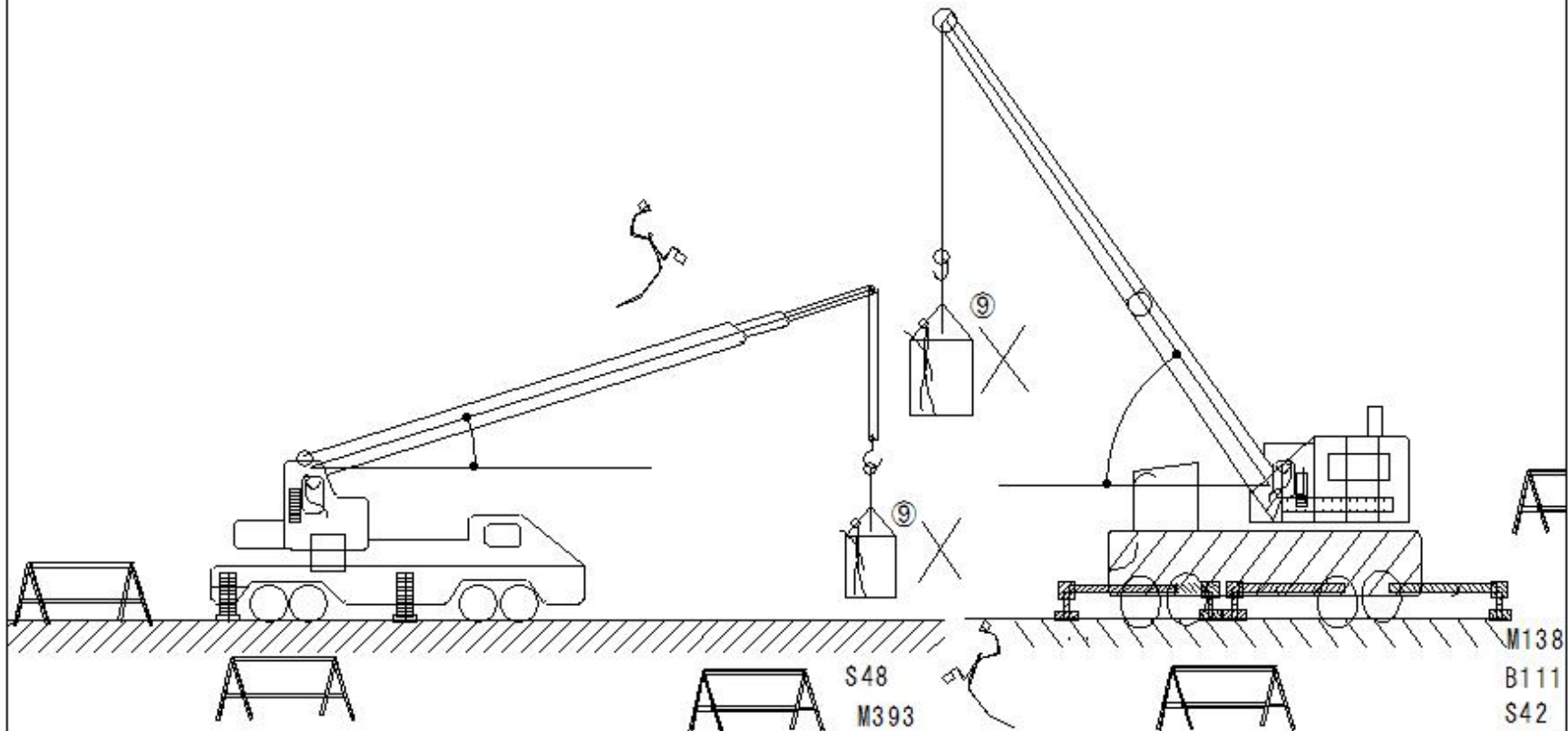
(S370)Mobile crane safety operations

(S370)Mobile crane safety operations

Mobile crane safety operations

⑨ Do not work with people hoisted

truck crane



(S371)Mobile crane safety operations

(S371)Mobile crane safety operations

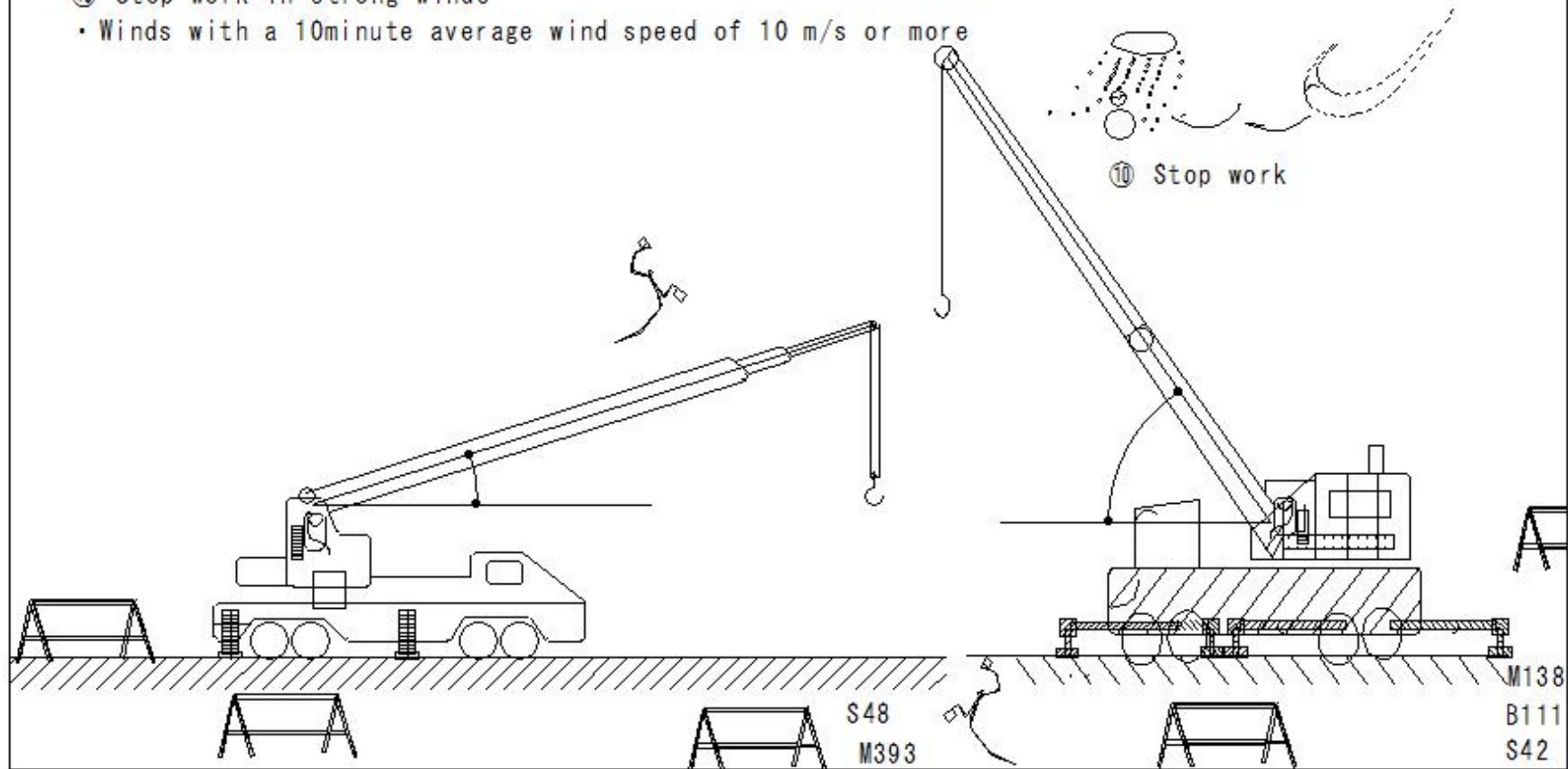
Mobile crane safety operations

⑩ Stop work in strong winds

- Winds with a 10minute average wind speed of 10 m/s or more

truck crane

⑩ Stop work



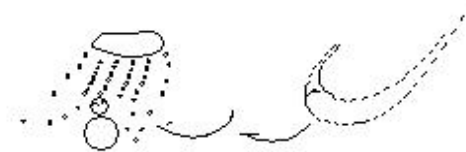
(S372) Mobile crane safety operations

(S372) Mobile crane safety operations

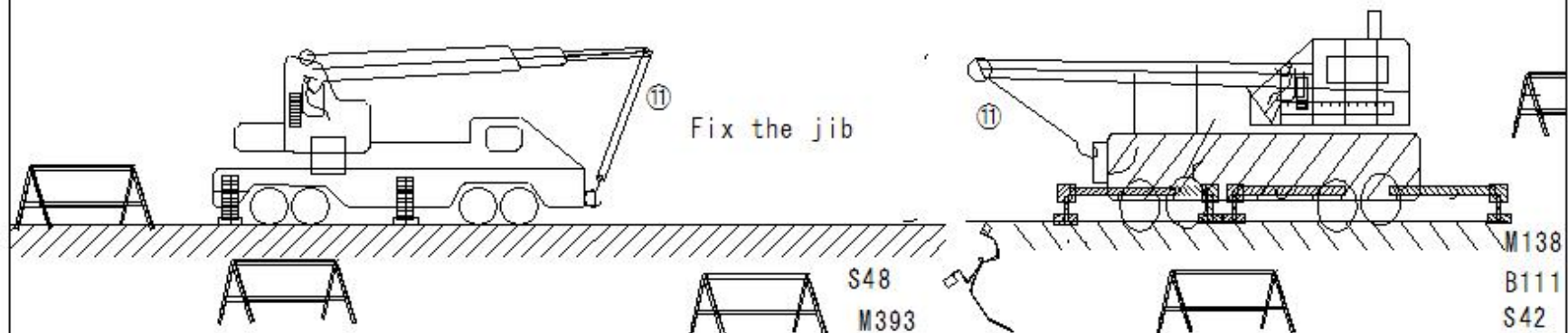
Mobile crane safety operations

⑪ Prevent tipping in strong winds

Fix the jib



truck crane



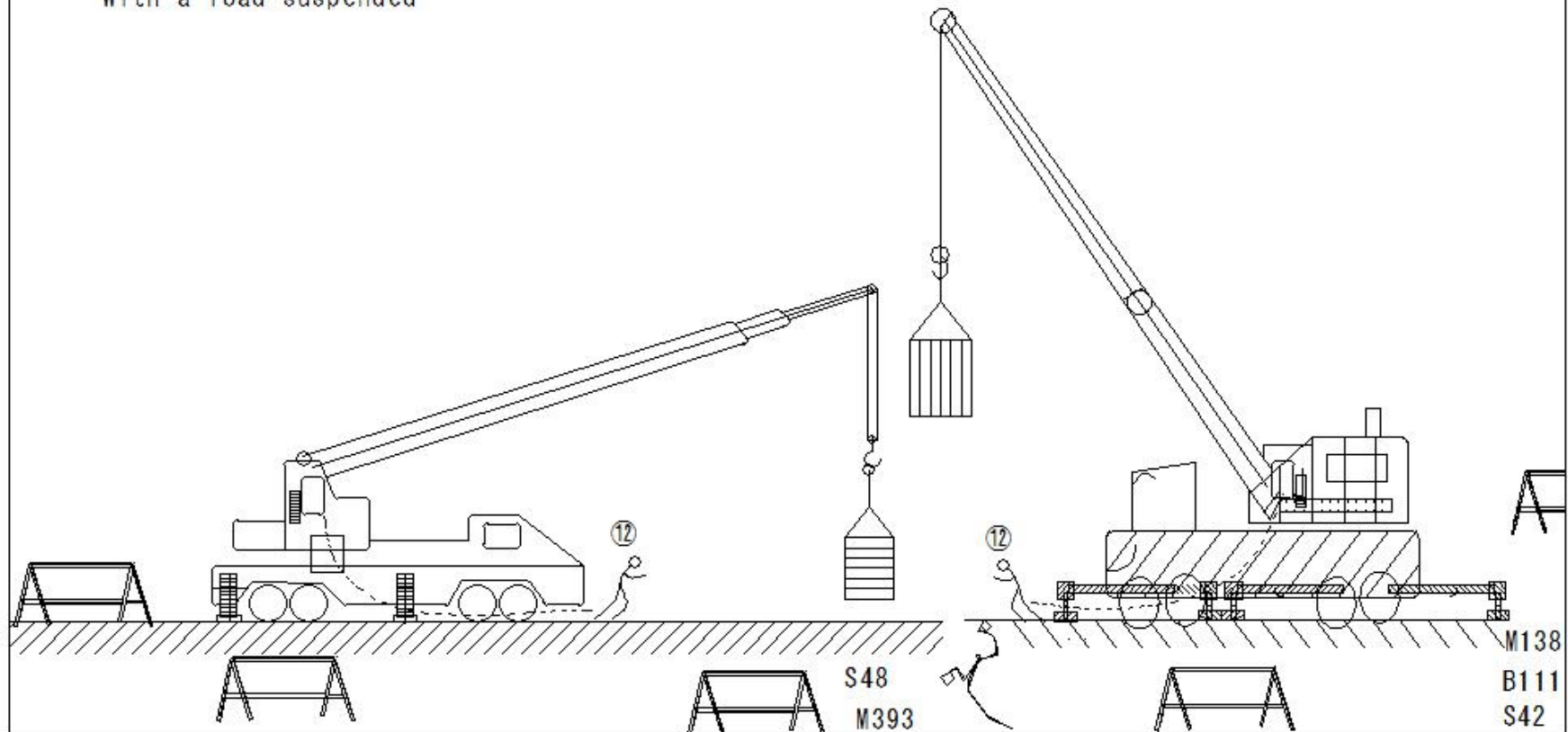
(S373)Mobile crane safety operations

(S373) Mobile crane safety operations

Mobile crane safety operations

- ⑫ Do not leave the operating position
With a load suspended

truck crane



(S374) Mobile crane safety operations

(S374) Mobile crane safety operations

Mobile crane safety operations

⑬ Jib Assembly work

truck crane

Work supervisor

- Signs prohibiting entry except for authorized personnel
- Work is suspended in bad weather
- Determines work method and layout and directs work
- Checks tools, etc.

④⑤ Outriggers are extended to maximum

⑥ Follow signals

② Display of rated load

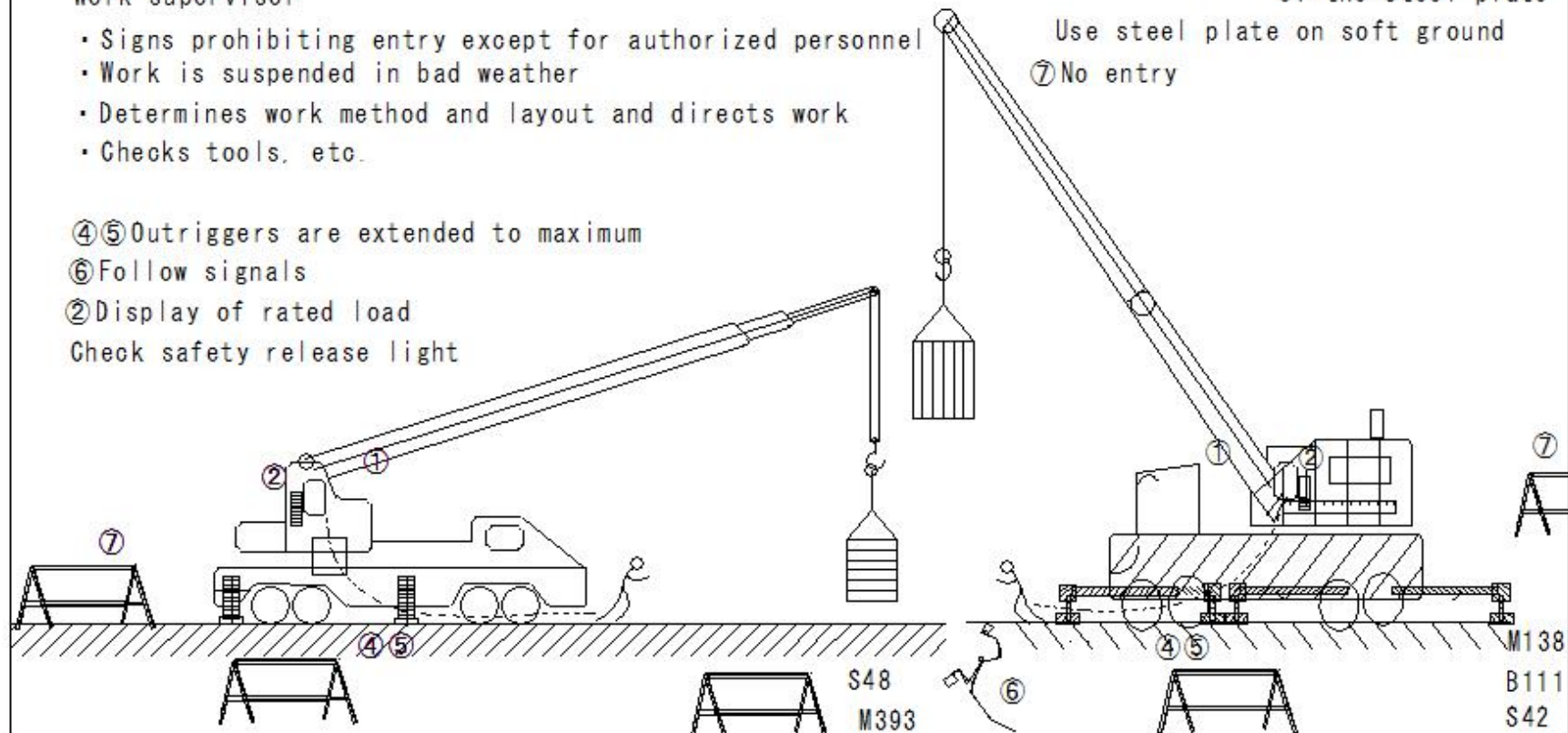
Check safety release light

① Limit of inclination angle

④⑤ Outriggers are in the center
of the steel plate

Use steel plate on soft ground

⑦ No entry

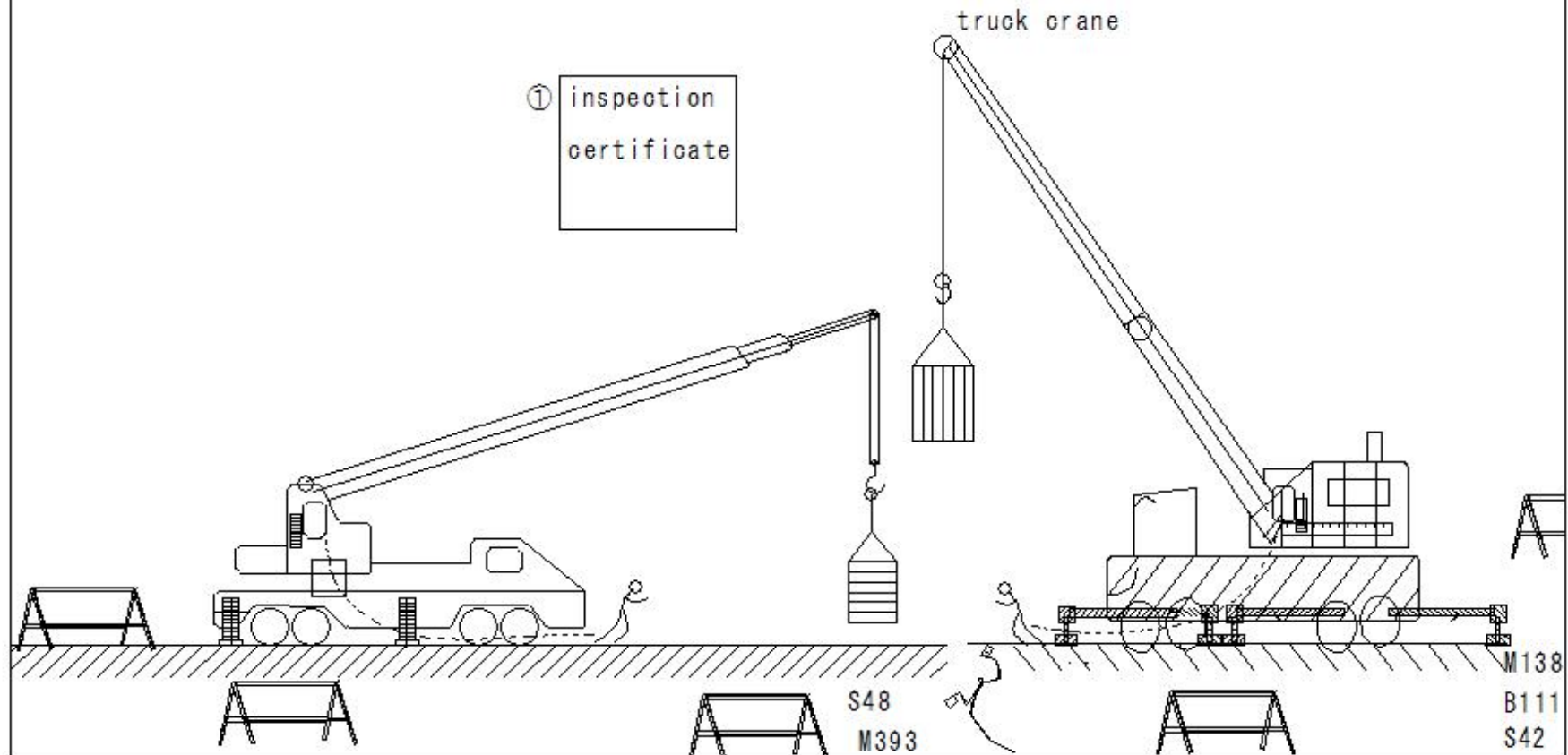


(S375)Mobile crane management

(S375) Mobile crane management

Mobile crane management

① Installation of inspection certificate

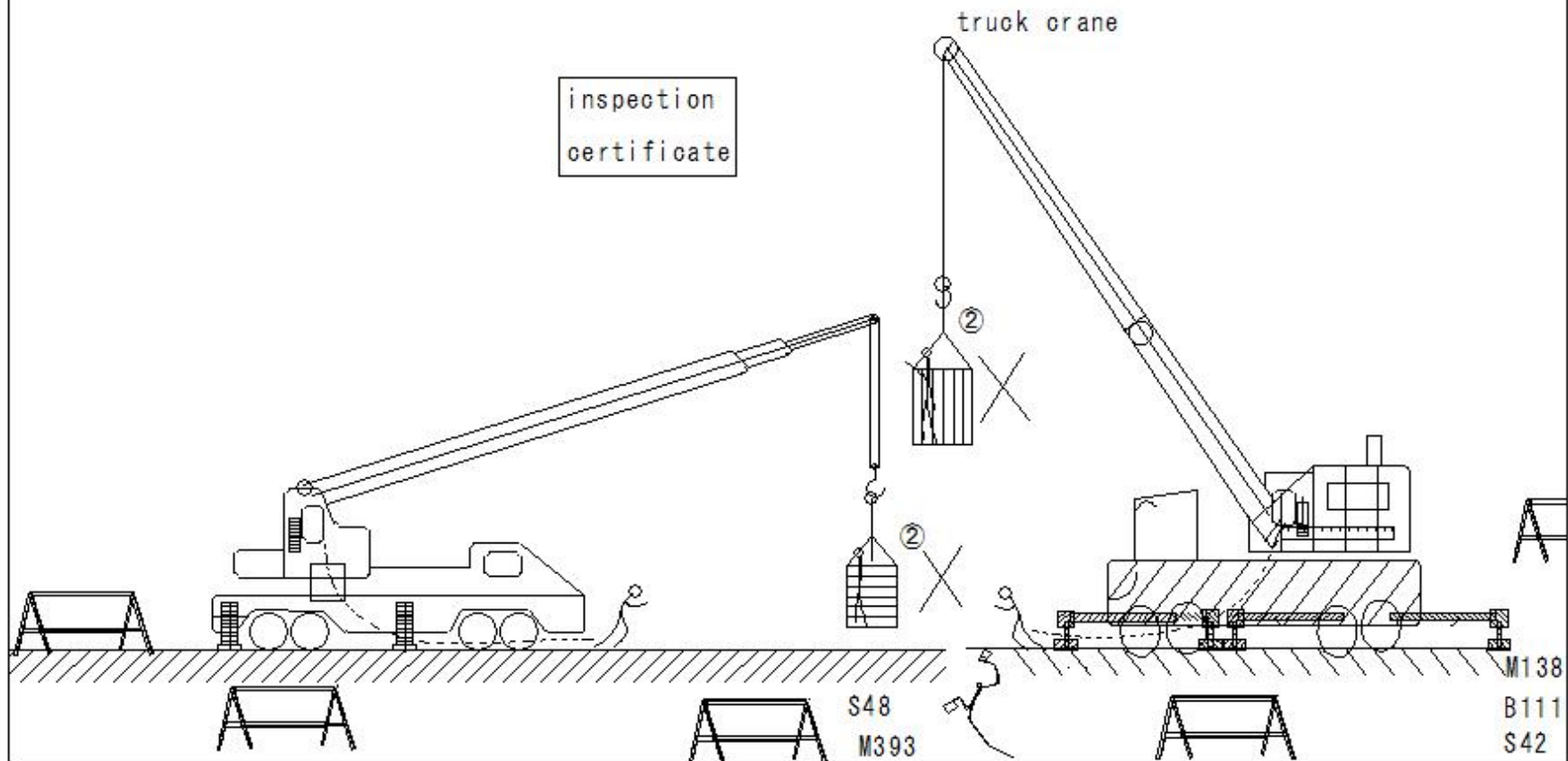


(S376)Mobile crane management

(S376) Mobile crane management

Mobile crane management

② Restrictions on use

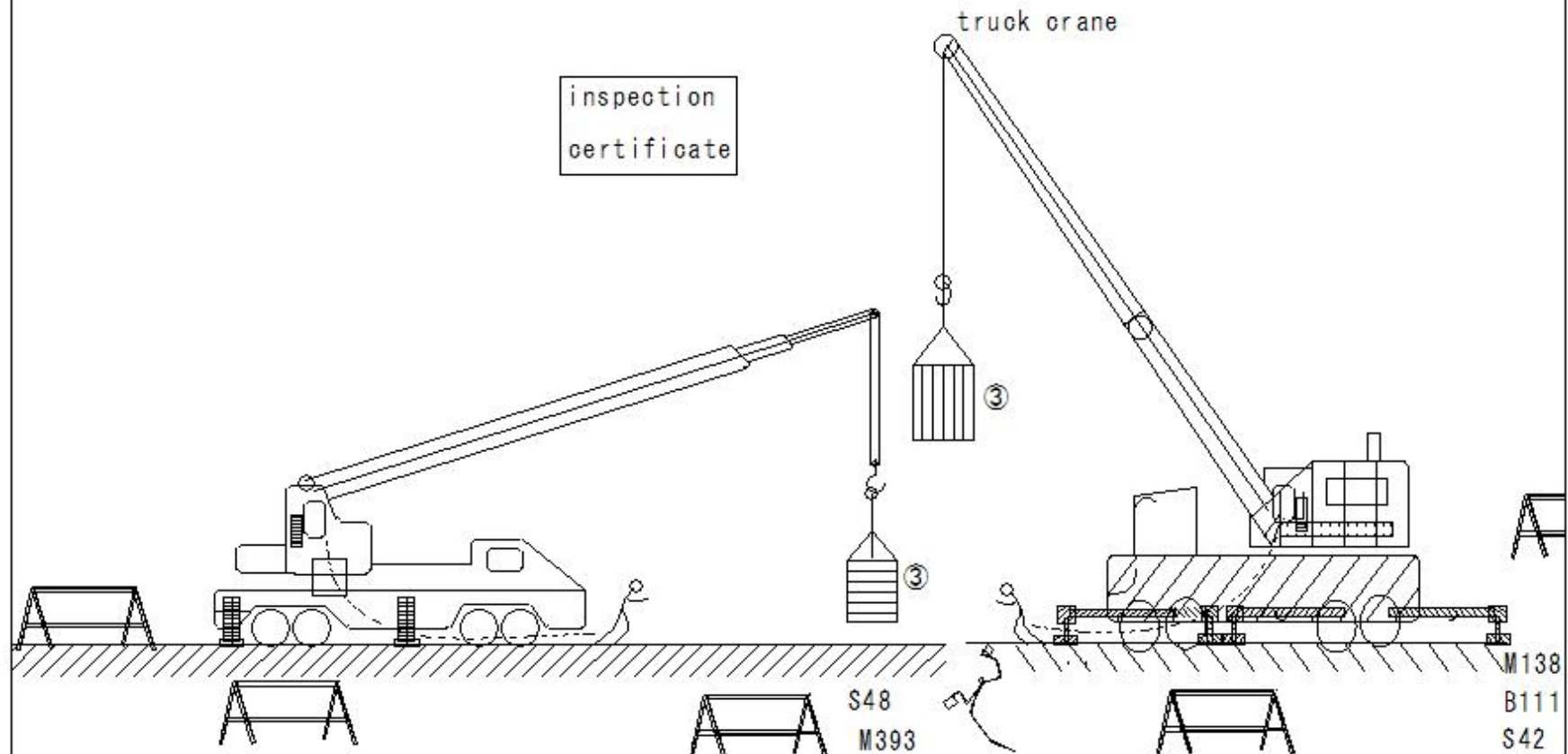


(S377)Mobile crane management

(S377)Mobile crane management

Mobile crane management

③ Load conditions as design criteria

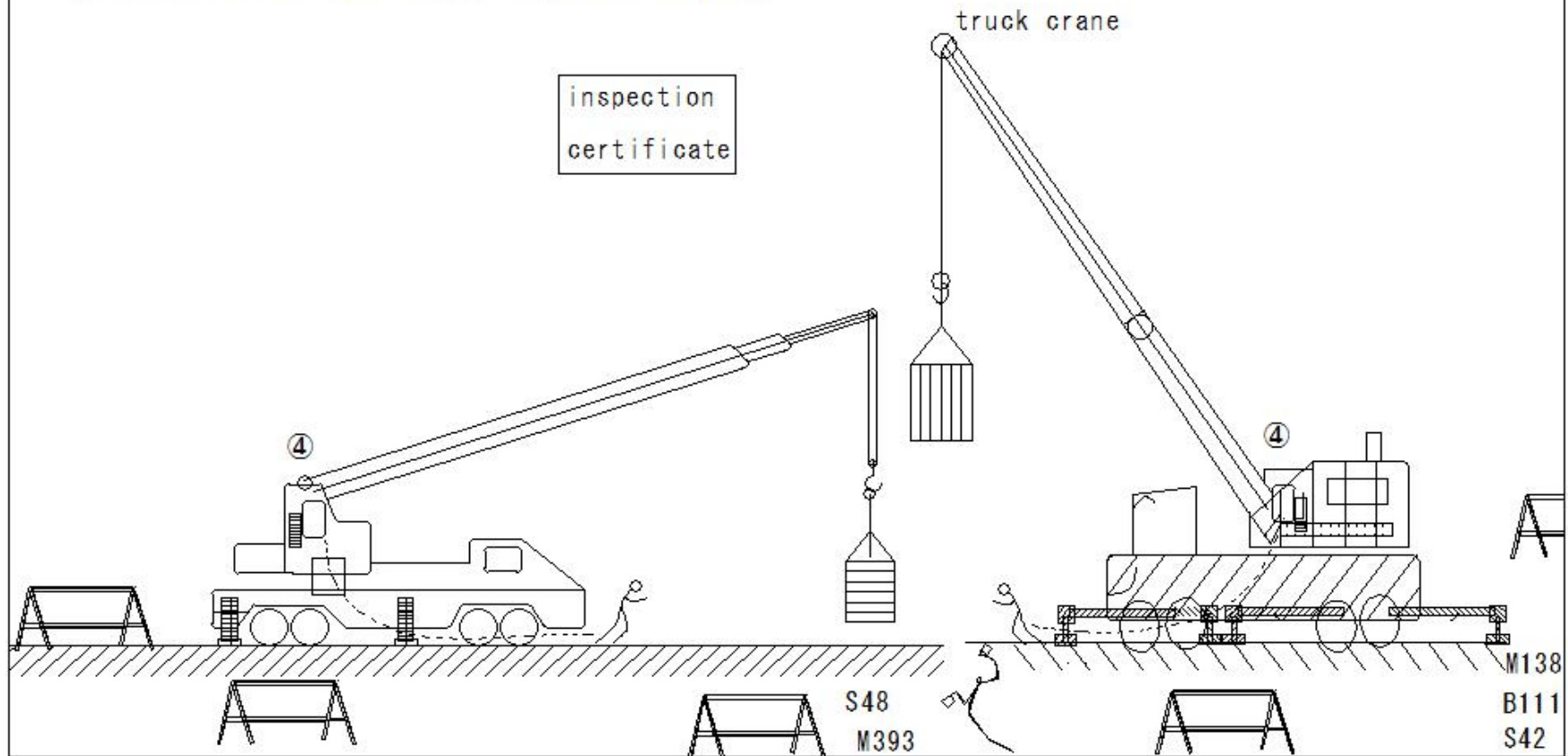


(S378)Mobile crane management

(S378)Mobile crane management

Mobile crane management

④ Adjustment of over-winding prevention device

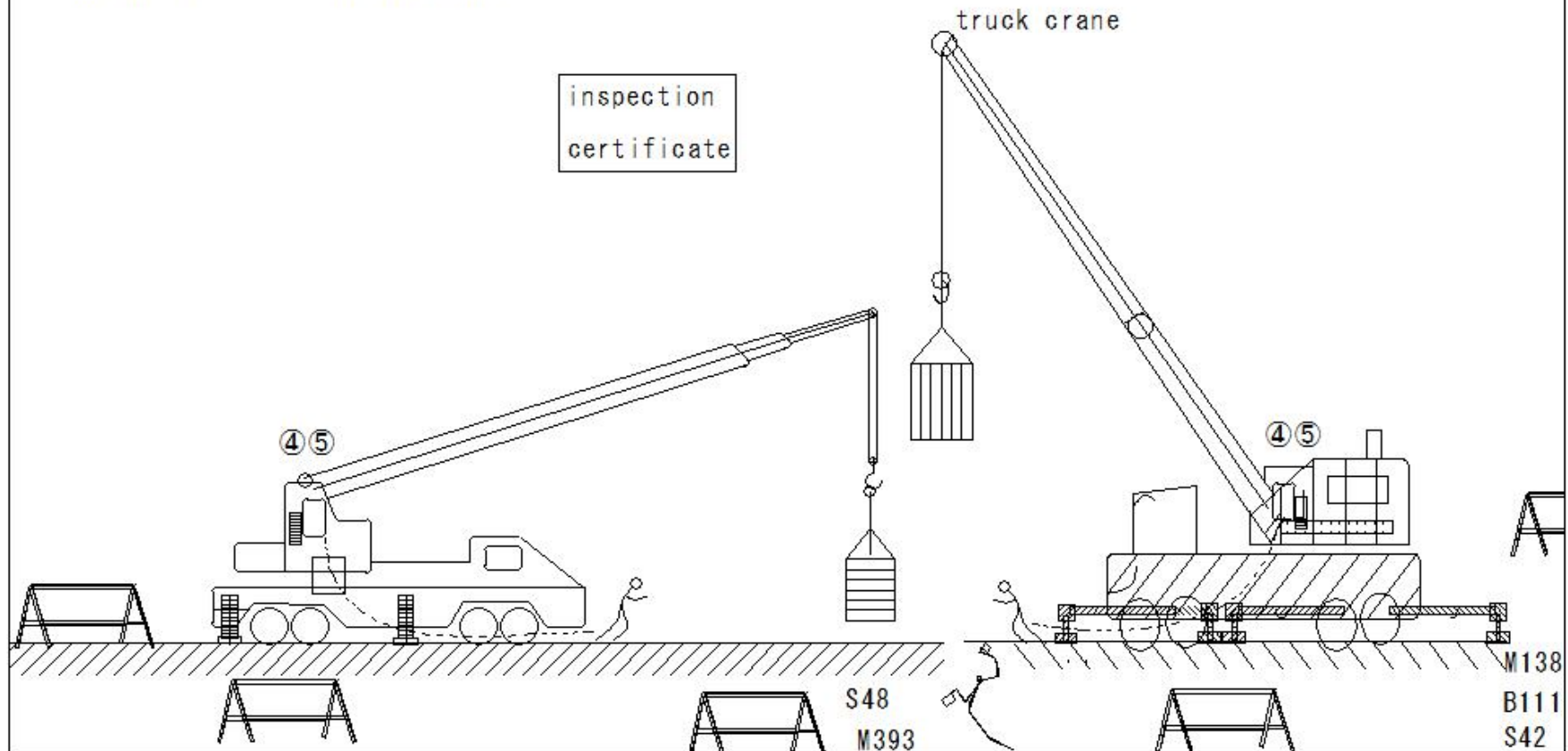


(S379)Mobile crane management

(S379) Mobile crane management

Mobile crane management

⑤ Adjustment of safety valve

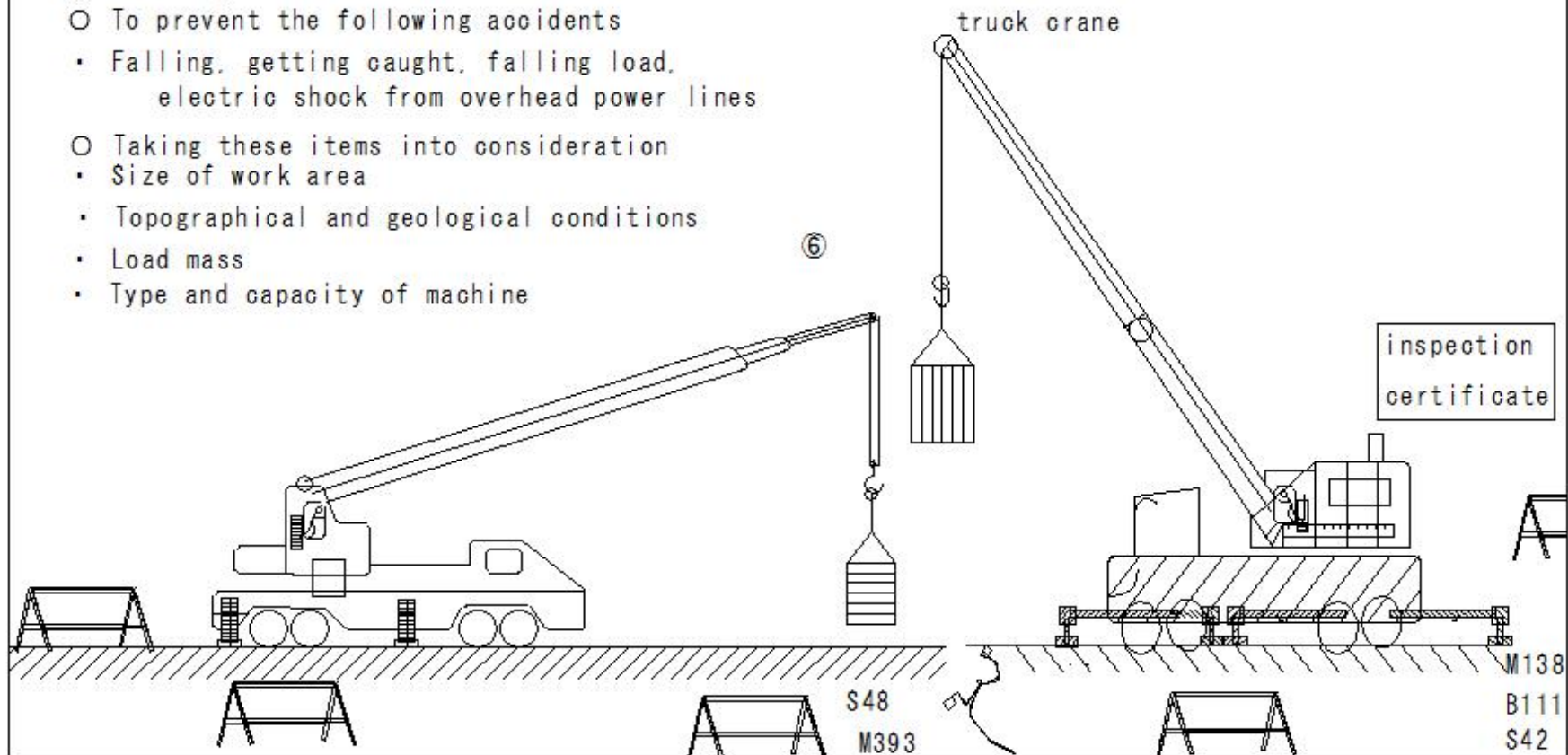


(S380)Mobile crane management

(S380)Mobile crane management

Mobile crane management

- ⑥ Deciding on work method
- To prevent the following accidents
 - Falling, getting caught, falling load, electric shock from overhead power lines
- Taking these items into consideration
 - Size of work area
 - Topographical and geological conditions
 - Load mass
 - Type and capacity of machine

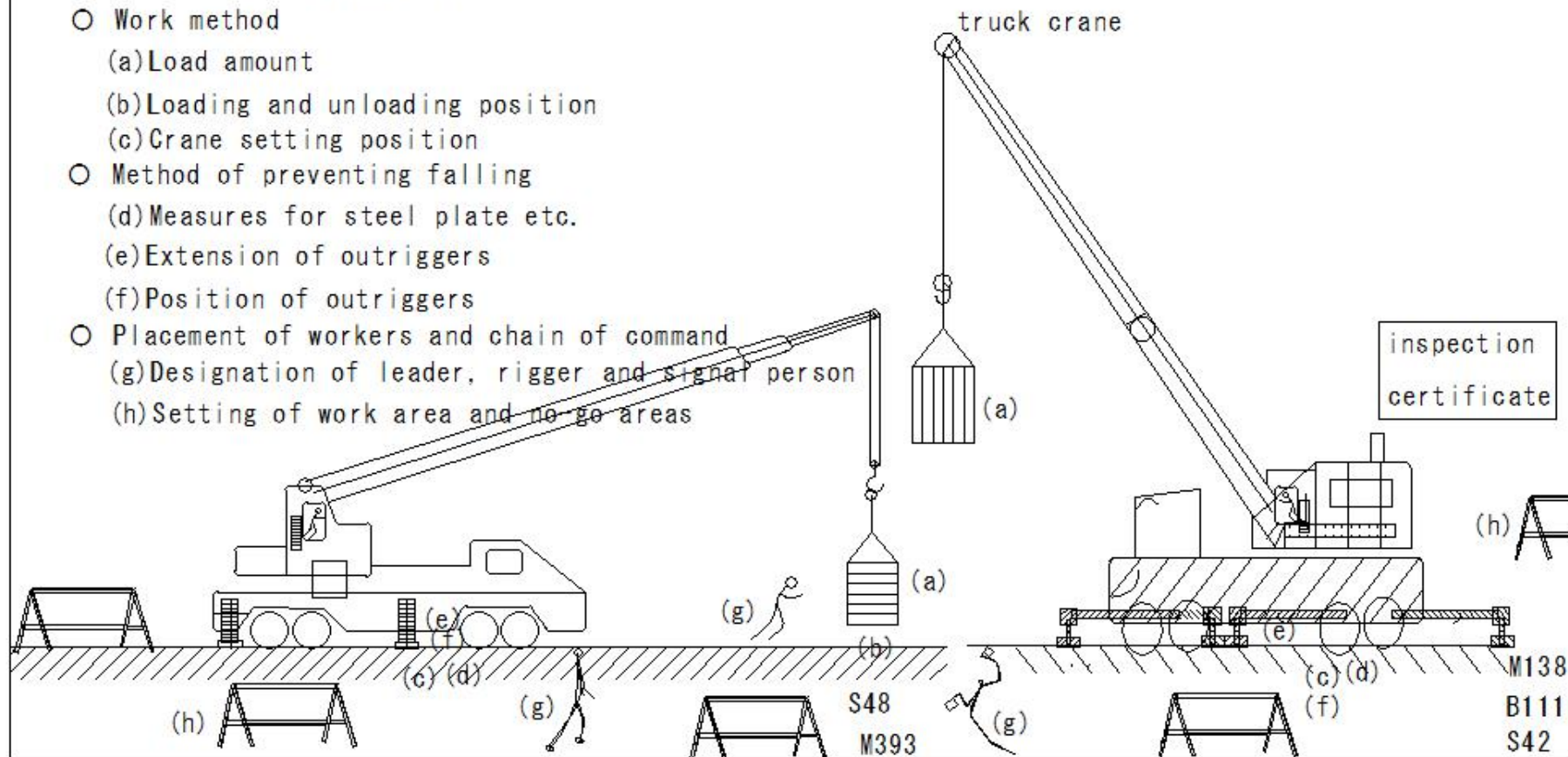


(S381) Mobile crane management

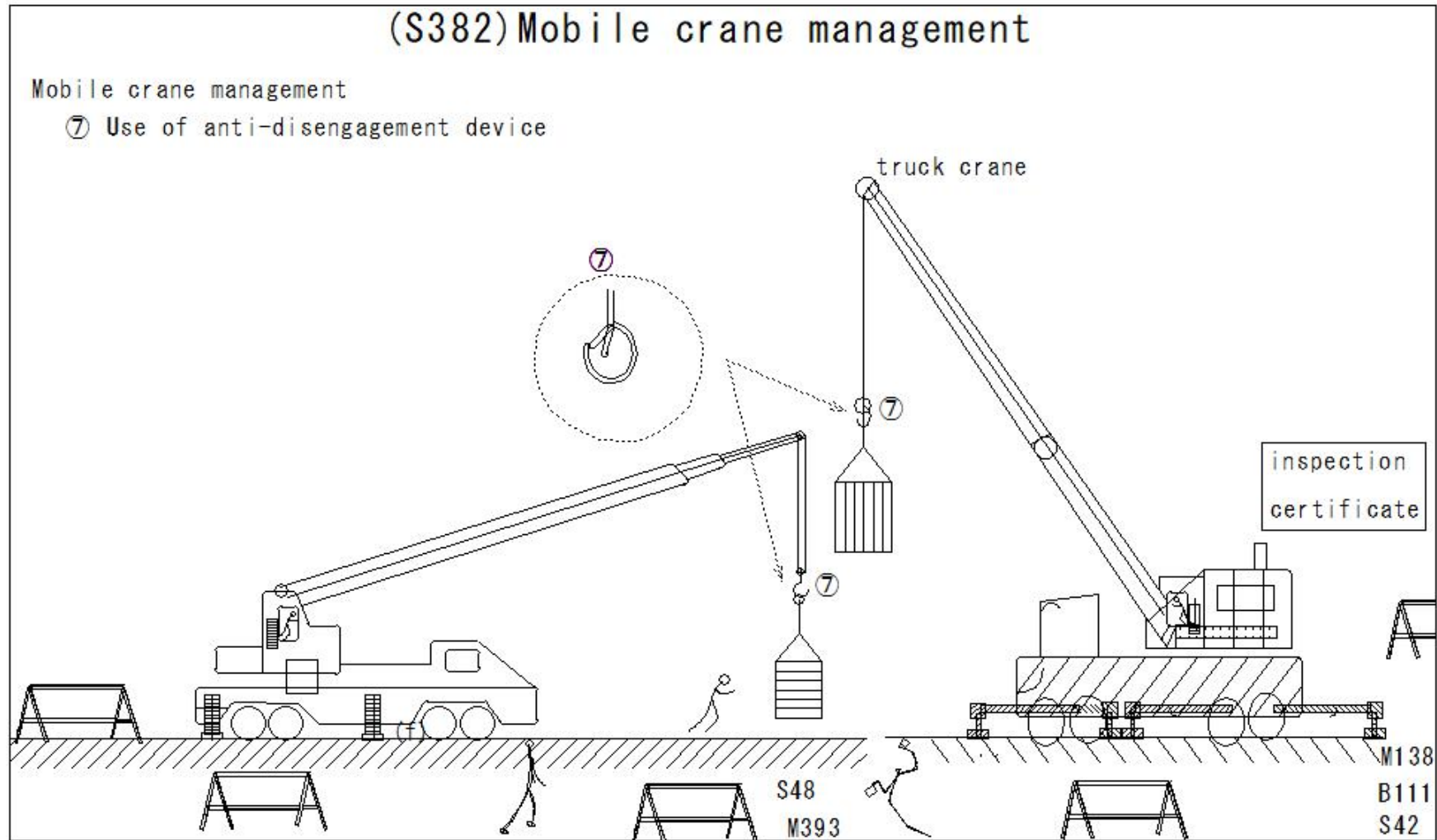
(S381) Mobile crane management

Mobile crane management

- ⑥ Deciding on work method
- Work method
 - (a) Load amount
 - (b) Loading and unloading position
 - (c) Crane setting position
- Method of preventing falling
 - (d) Measures for steel plate etc.
 - (e) Extension of outriggers
 - (f) Position of outriggers
- Placement of workers and chain of command
 - (g) Designation of leader, rigger and signal person
 - (h) Setting of work area and no-go areas



(S382) Mobile crane management

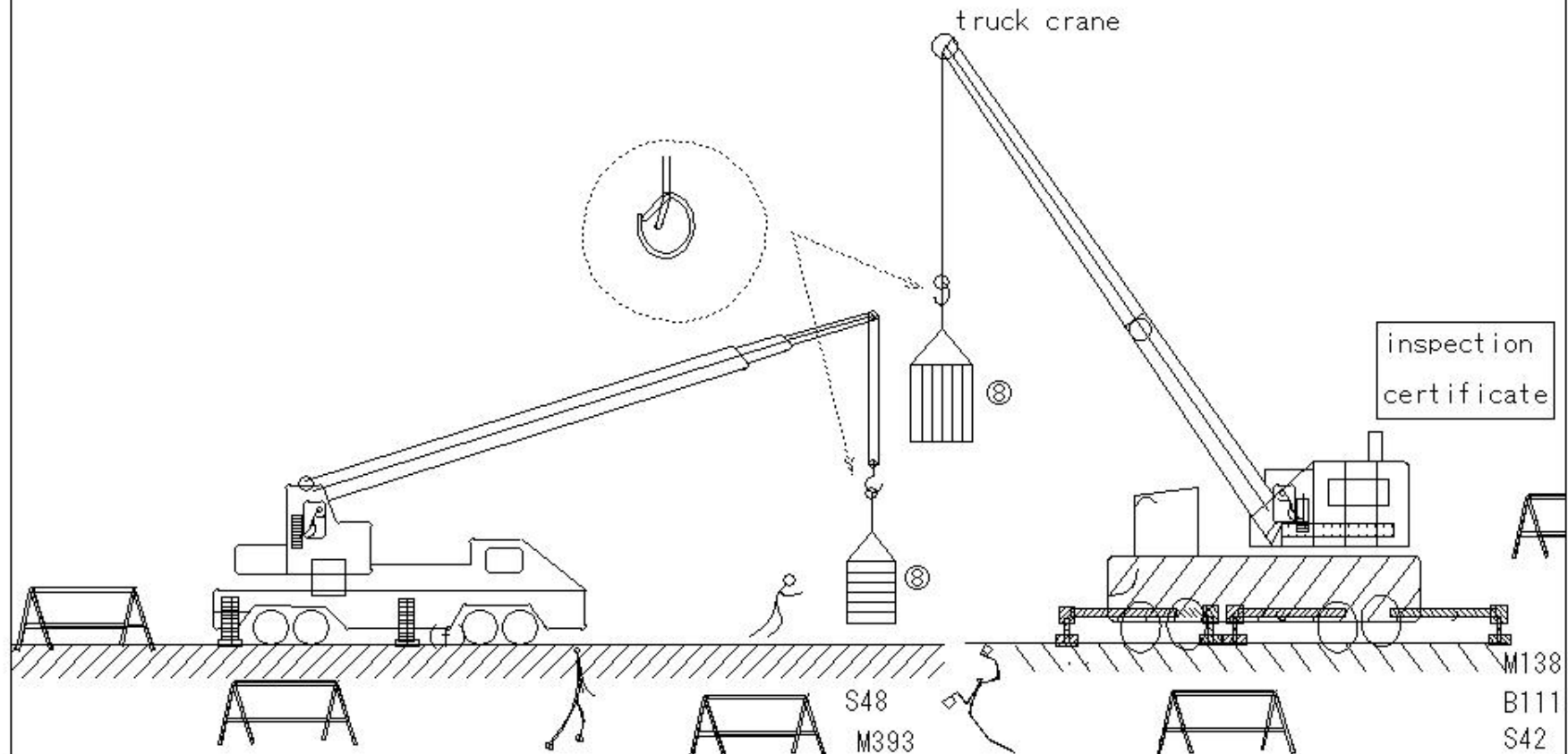


(S383) Mobile crane management

(S383) Mobile crane management

Mobile crane management

⑧ Restriction of overload

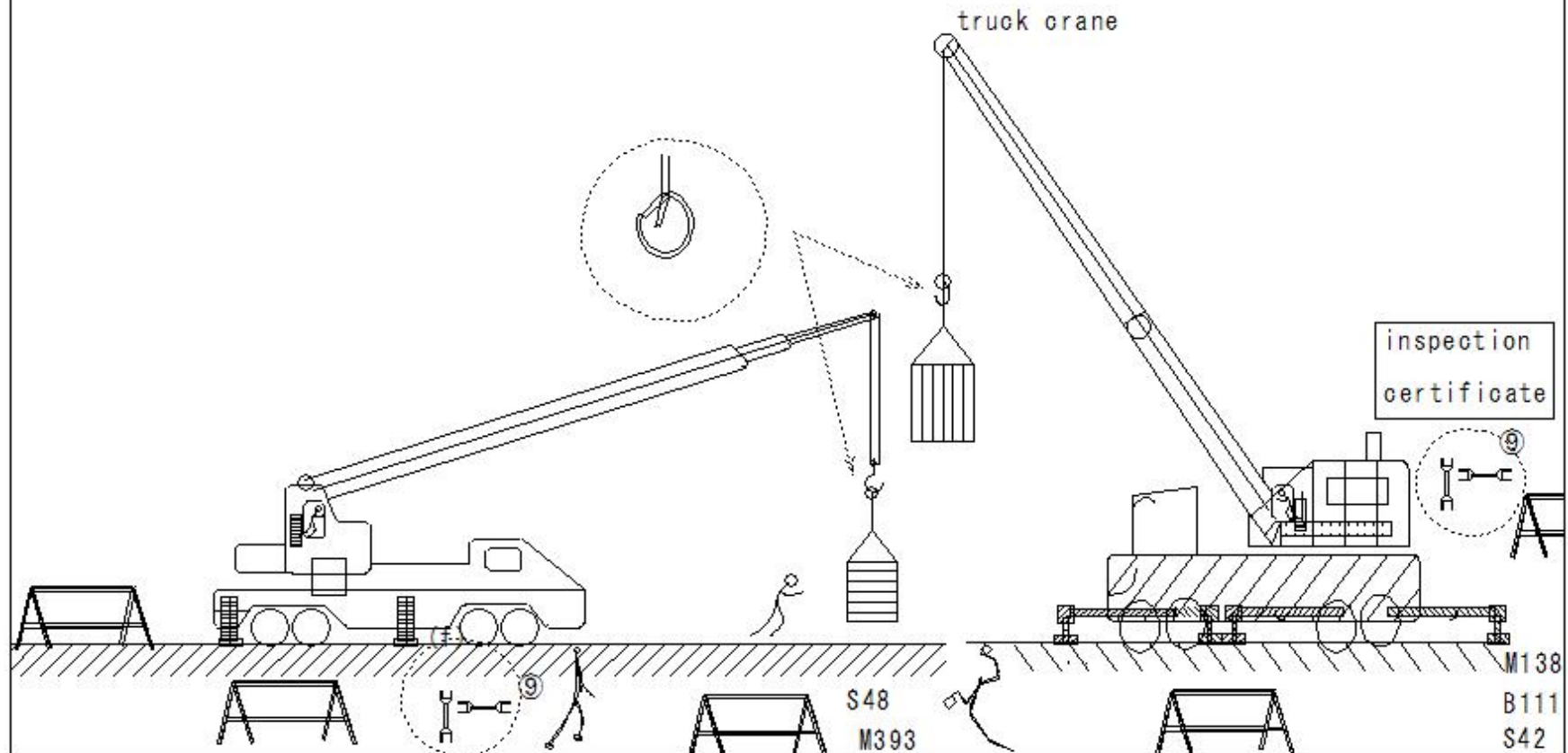


(S384) Mobile crane management

(S384) Mobile crane management

Mobile crane management

⑨ Crane inspection, inspection and repair

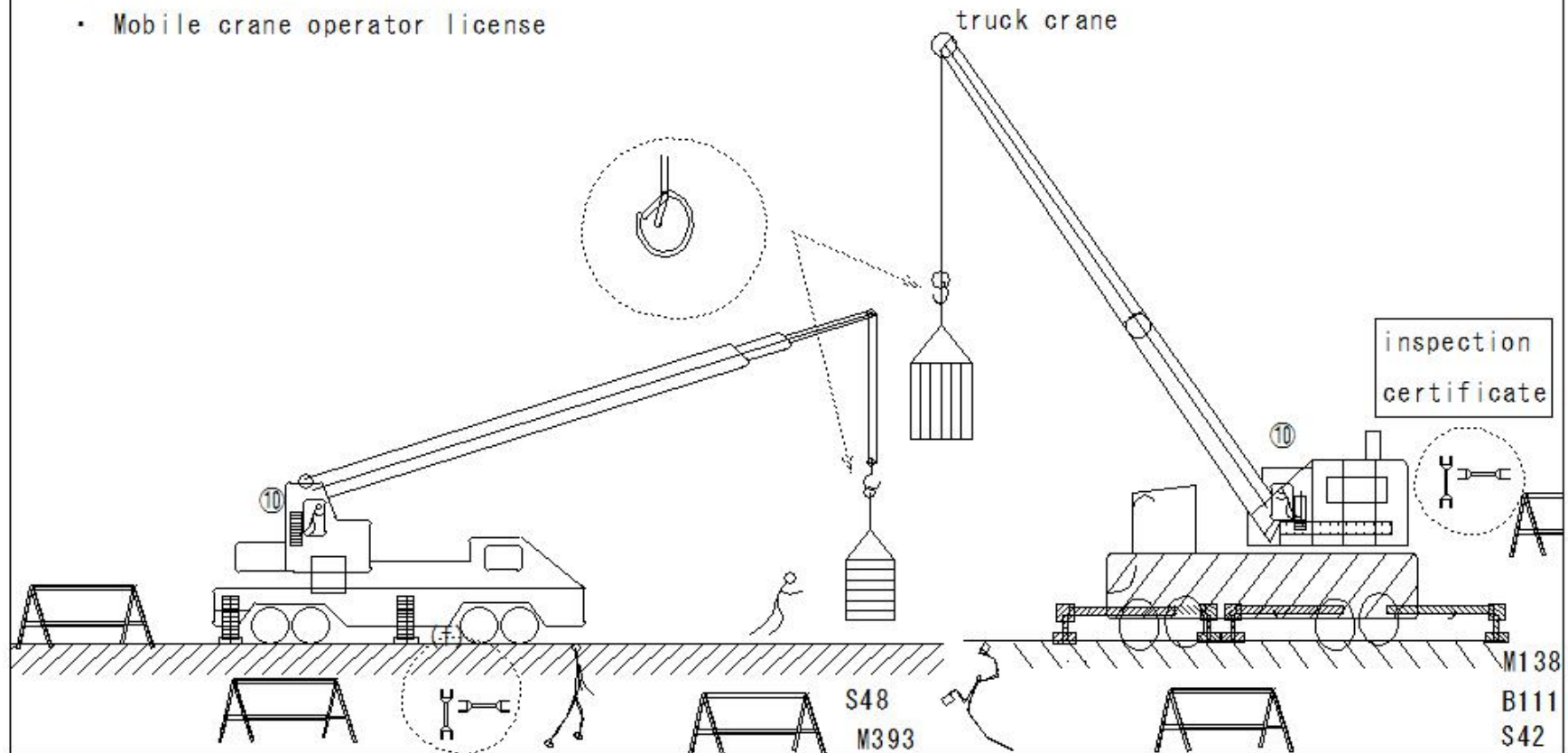


(S385)Mobile crane management

(S385)Mobile crane management

Mobile crane management

- ⑩ Operation qualification
 - Mobile crane operator license

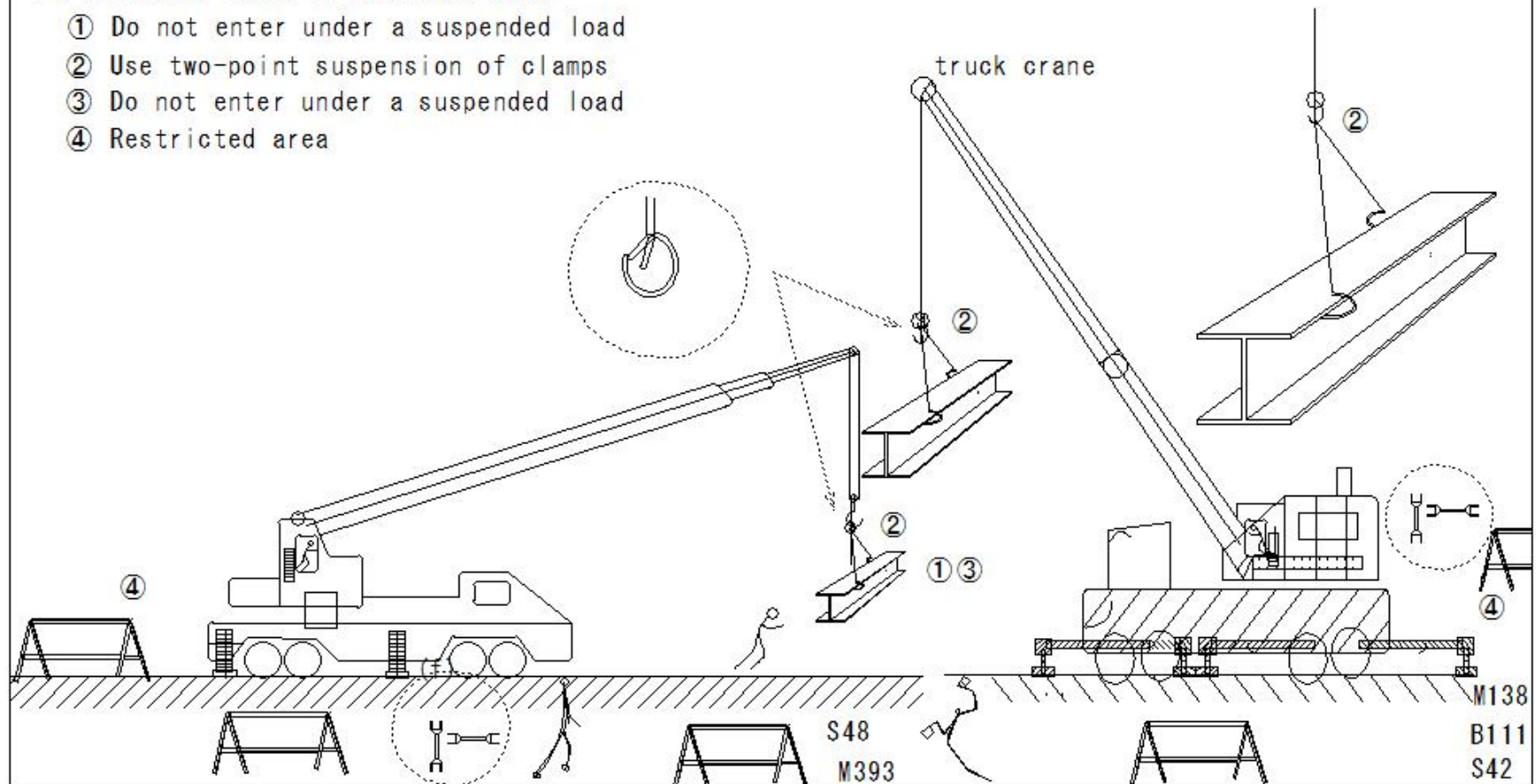


(S386)Do not enter under a suspended load

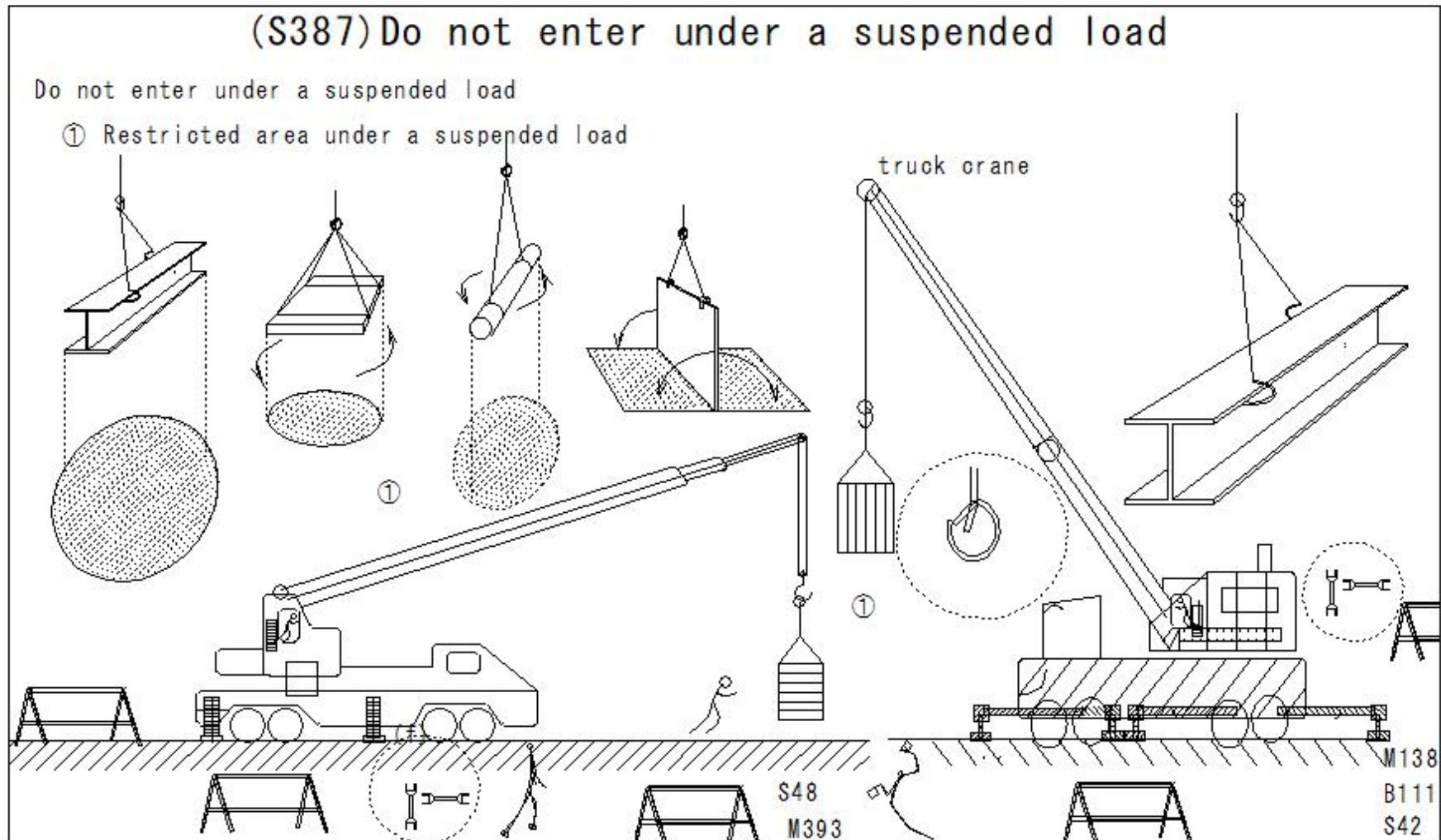
(S386)Do not enter under a suspended load

Do not enter under a suspended load

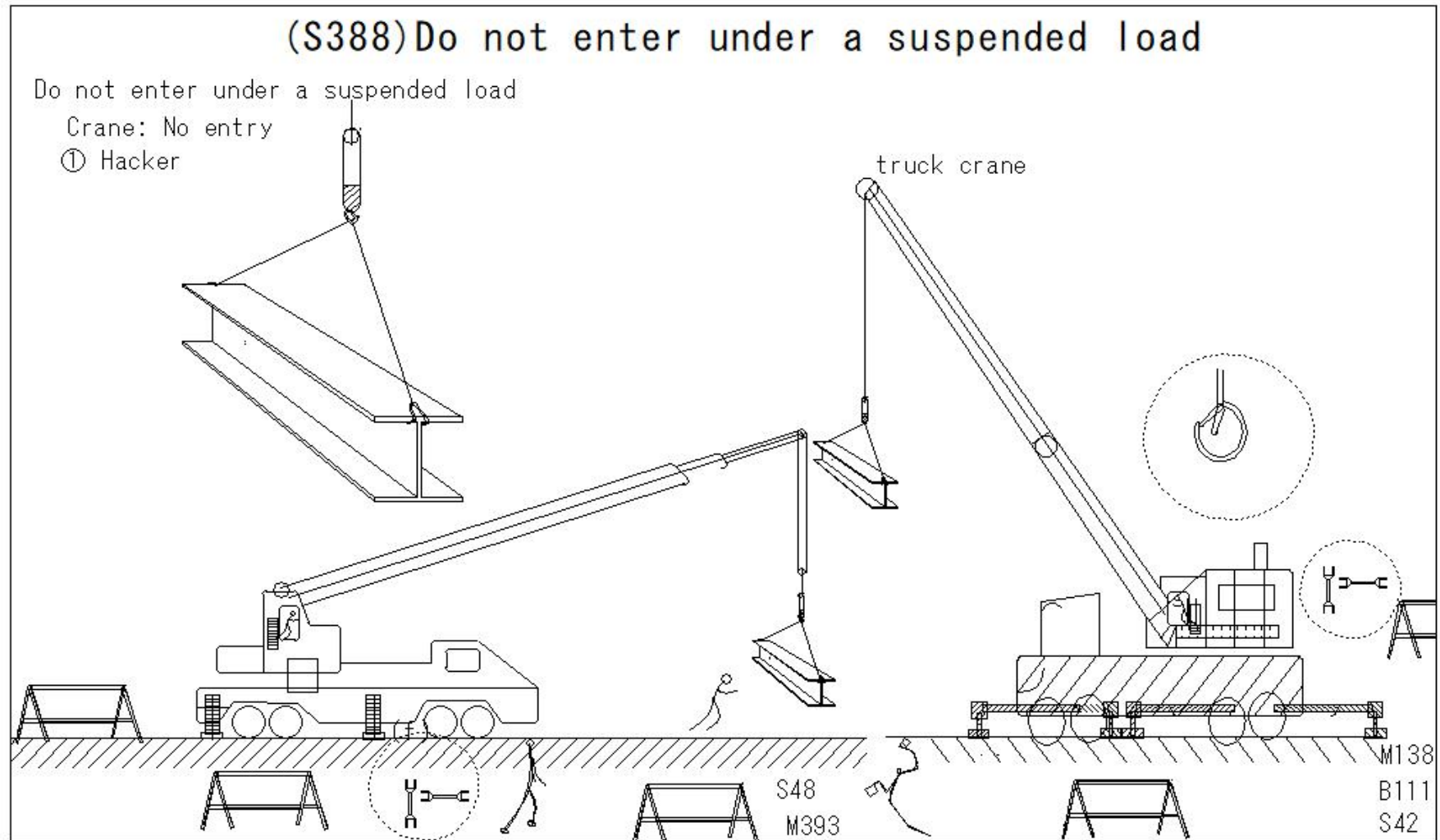
- ① Do not enter under a suspended load
- ② Use two-point suspension of clamps
- ③ Do not enter under a suspended load
- ④ Restricted area



(S387)Do not enter under a suspended load



(S388)Do not enter under a suspended load



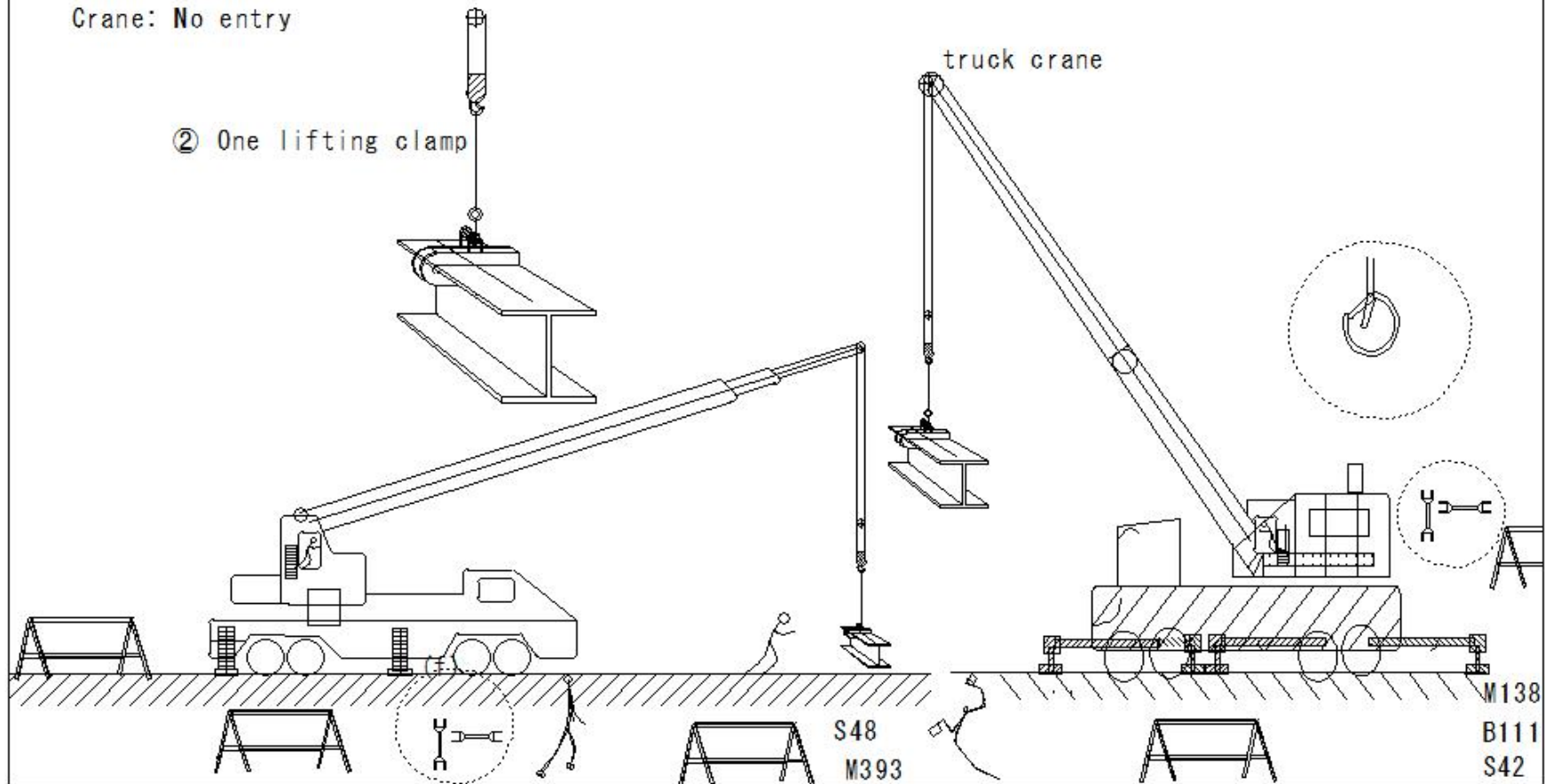
(S389)Do not enter under a suspended load

(S389) Do not enter under a suspended load

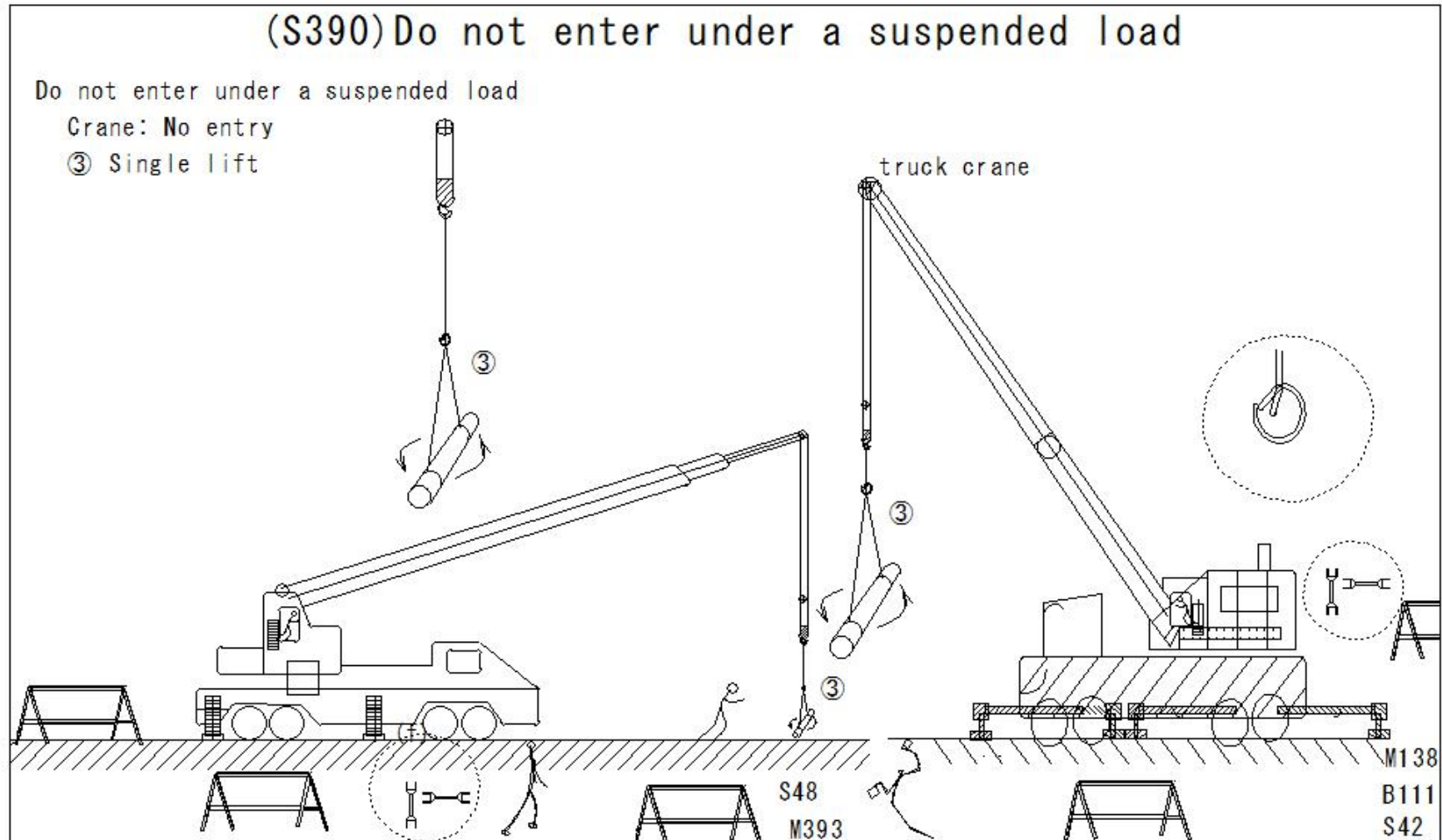
Do not enter under a suspended load

Crane: No entry

② One lifting clamp



(S390)Do not enter under a suspended load



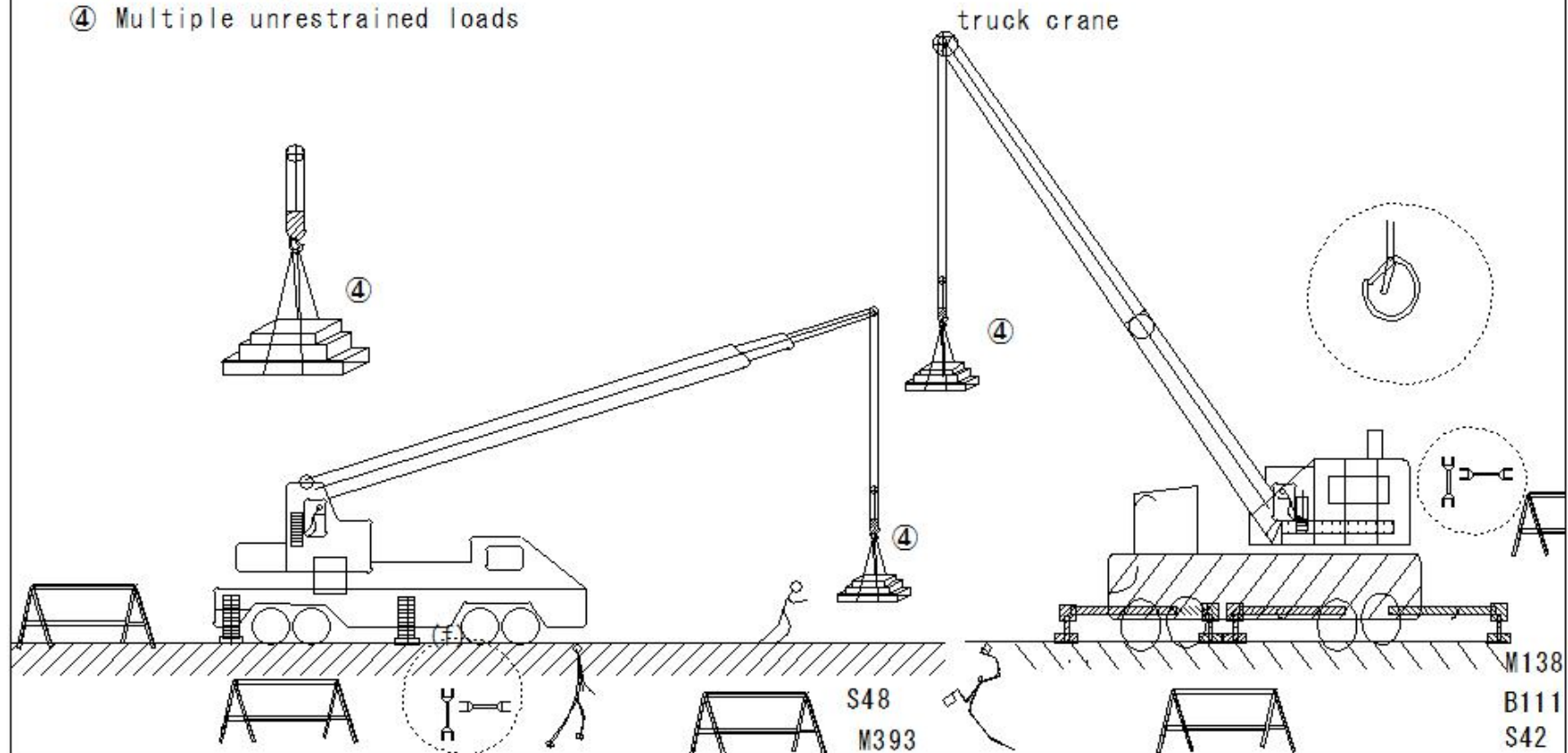
(S391)Do not enter under a suspended load

(S391)Do not enter under a suspended load

Do not enter under a suspended load

Crane: No entry

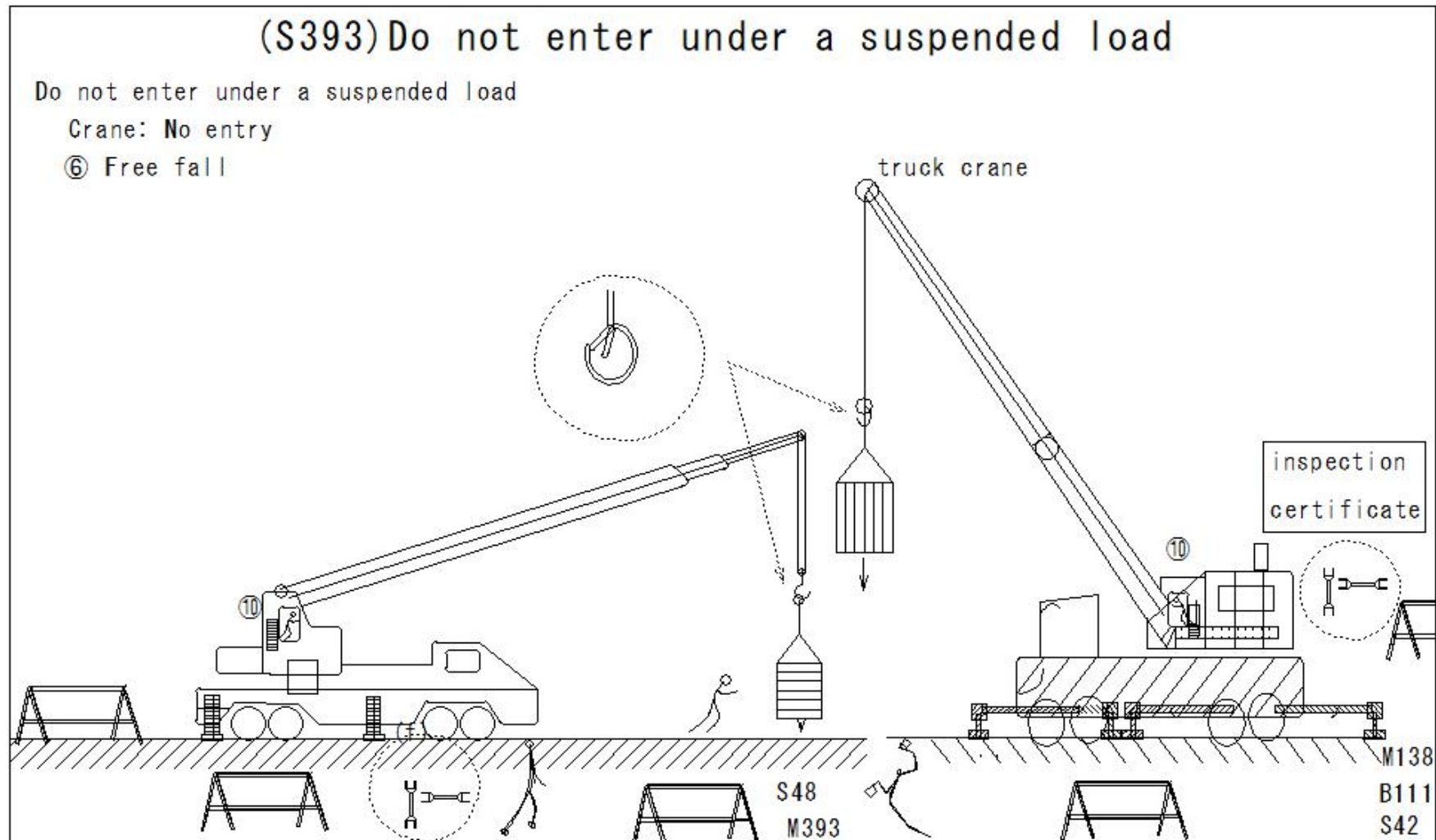
④ Multiple unrestrained loads



(S392) Do not enter under a suspended load

Crane: No entry

(S393)Do not enter under a suspended load



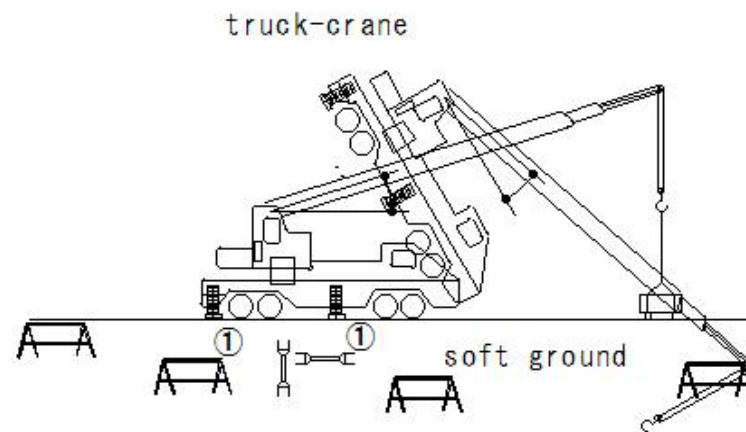
(S394)How to use a mobile crane

(S394)How to use a mobile crane

How to use a mobile crane

① Use a deck for soft ground, etc.

Set the outriggers securely



S355
M393

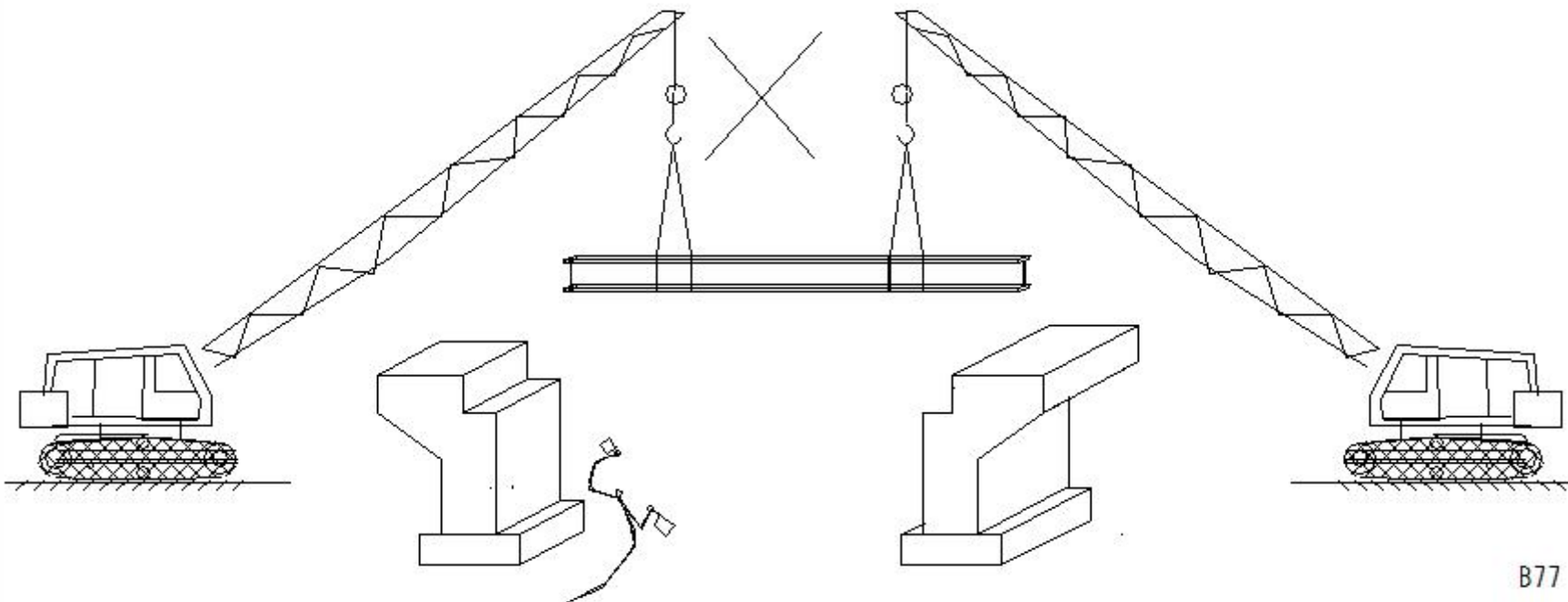
(S395)How to use a mobile crane

(S395)How to use a mobile crane

How to use a mobile crane

② Co-hoisting is prohibited

In case of unavoidable, direct command from the leader



B77

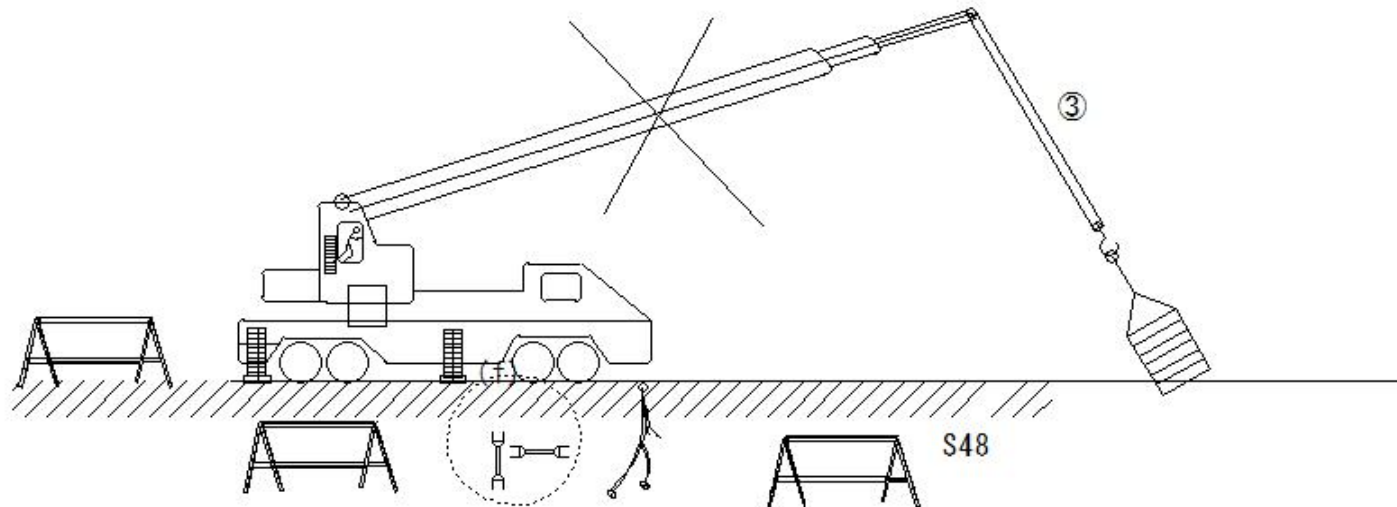
(S396)How to use a mobile crane

(S396)How to use a mobile crane

How to use a mobile crane

③ Do not pull horizontally or hoist diagonally

The boom will be damaged

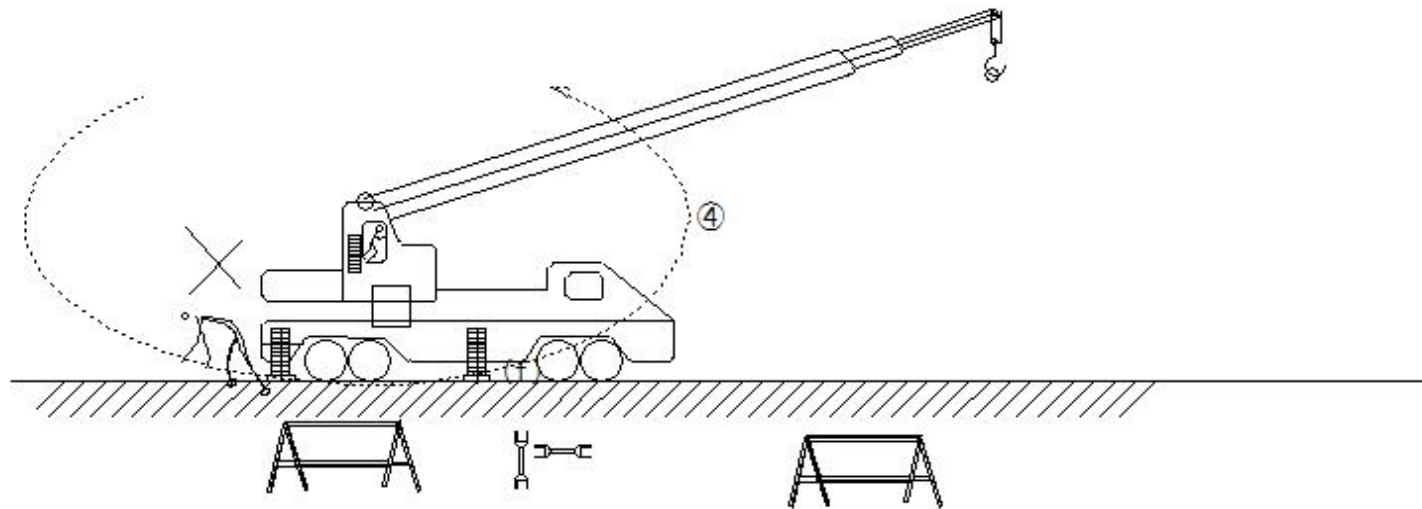


(S397)How to use a mobile crane

(S397)How to use a mobile crane

How to use a mobile crane

④ Turn slowly



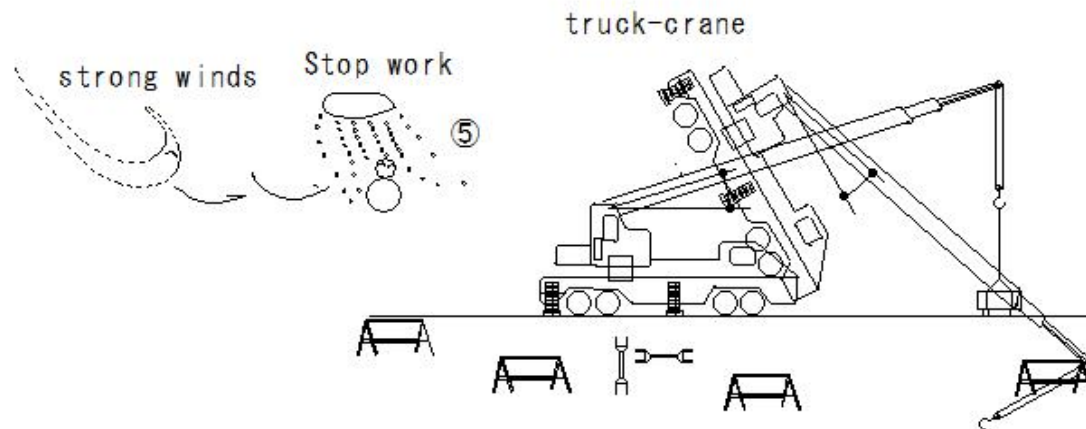
(S398)How to use a mobile crane

(S398)How to use a mobile crane

How to use a mobile crane

⑤ Stop work in strong winds

Danger of the load being swept away



M393
S355

(S399)How to use a mobile crane

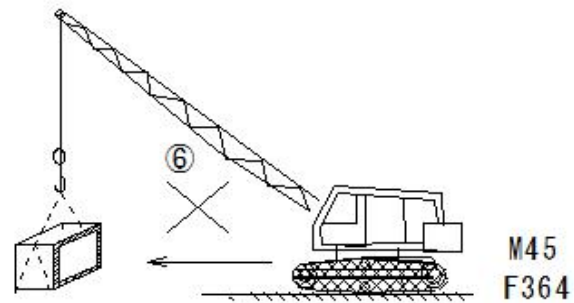
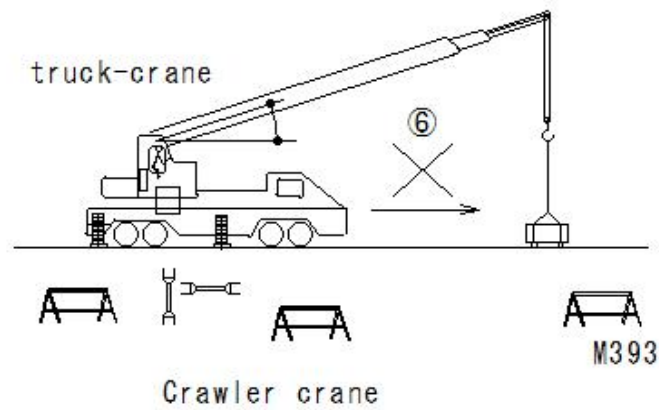
(S399)How to use a mobile crane

How to use a mobile crane

- ⑥ Do not travel with a suspended load

Wheel crane

Crawler crane



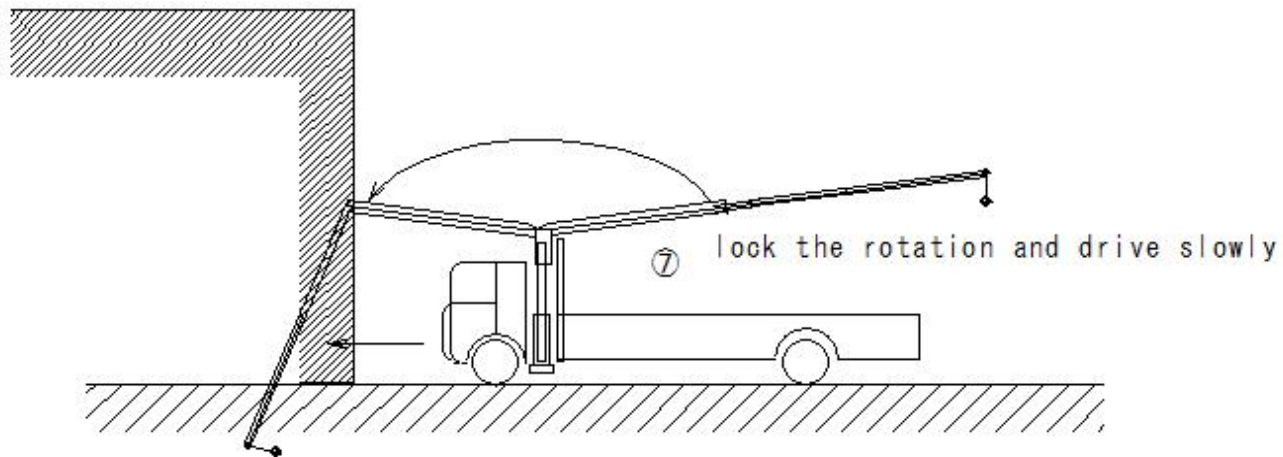
S359

(S400)How to use a mobile crane

(S400)How to use a mobile crane

How to use a mobile crane

- ⑦ In case of driving with the jib extended, lock the rotation and drive slowly

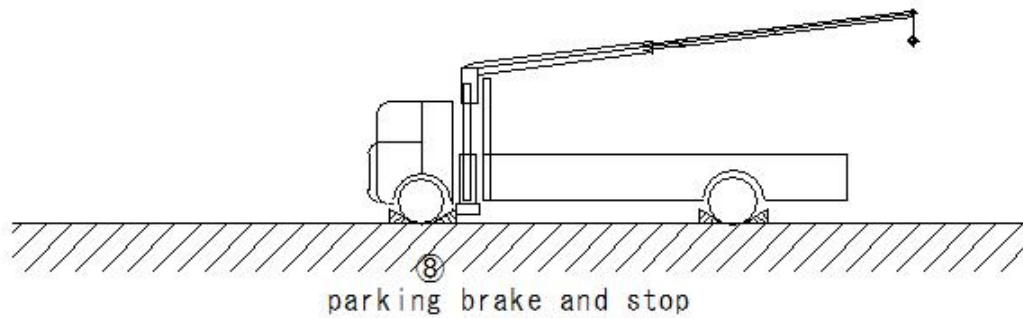


(S401)How to use a mobile crane

(S401)How to use a mobile crane

How to use a mobile crane

- ⑧ Always apply the parking brake and stop the car while working or parking

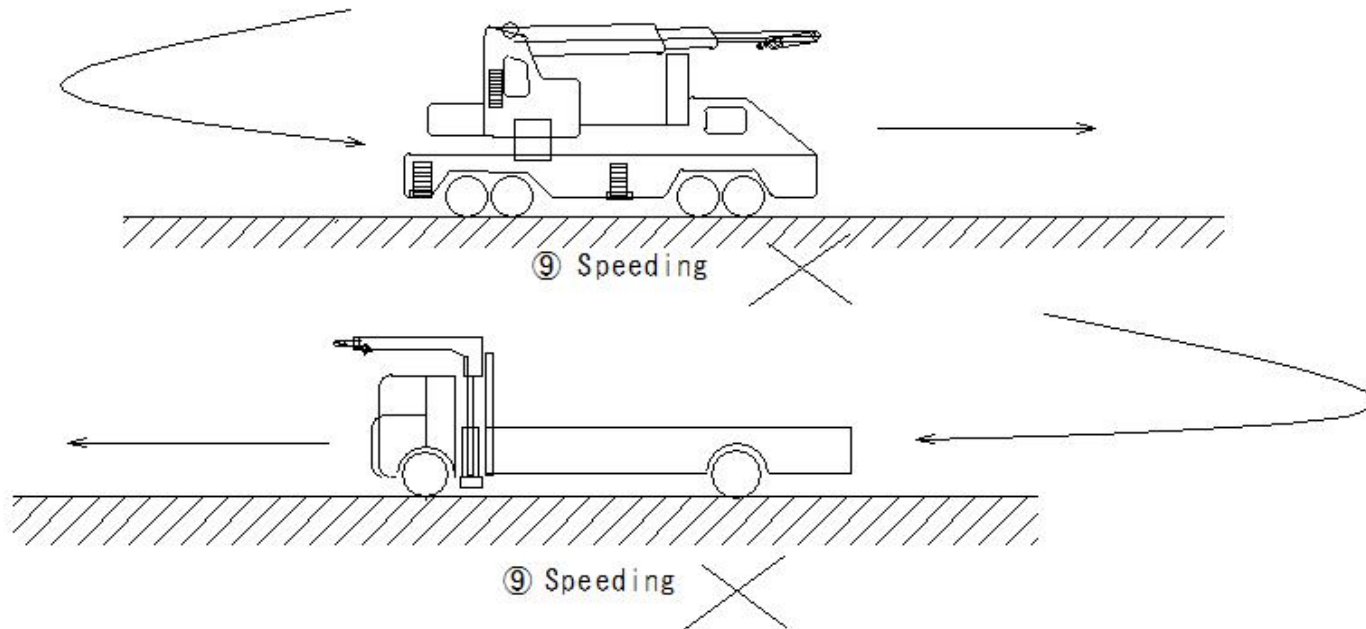


(S402)How to use a mobile crane

(S402)How to use a mobile crane

How to use a mobile crane

- ⑨ Do not drive aggressively while driving

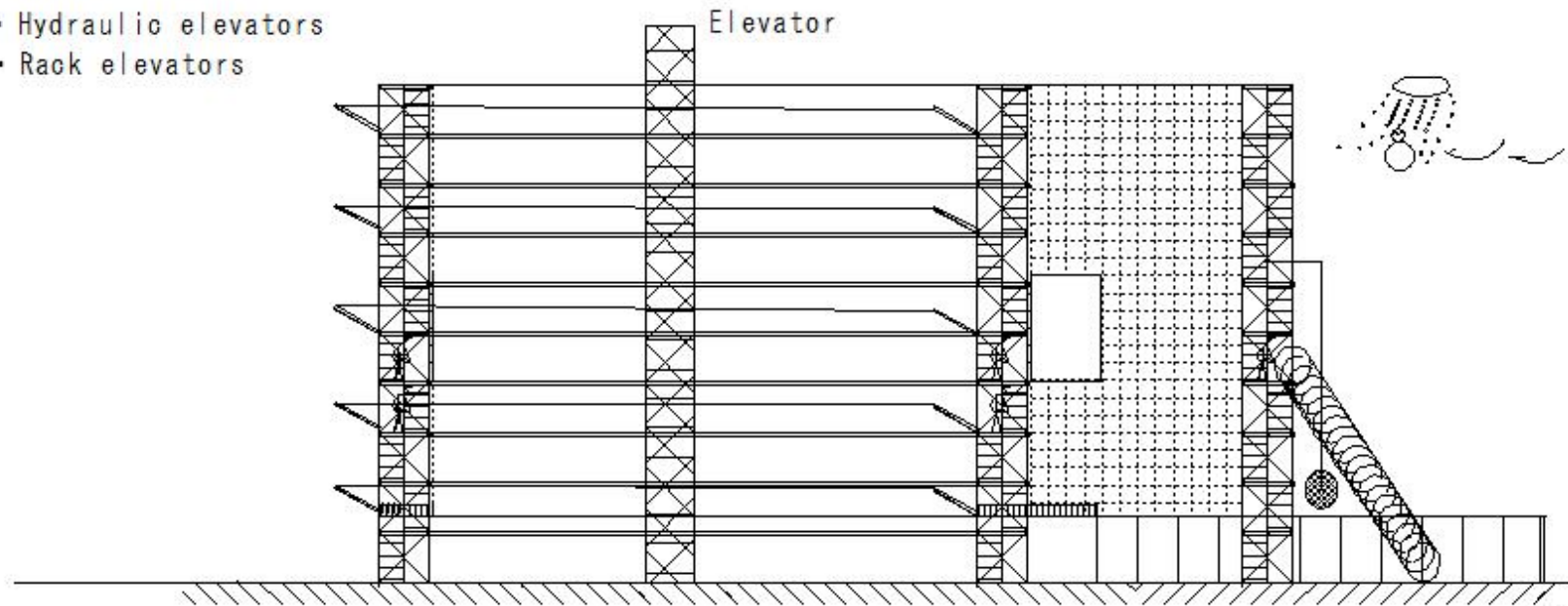


(S403)Elevator safety work

(S403)Elevator safety work

Elevator safety work

- Classification by use and structure
 - Permanent elevators
 - Construction elevators
- Classification by structure
 - Rope elevators
 - Hydraulic elevators
 - Rack elevators



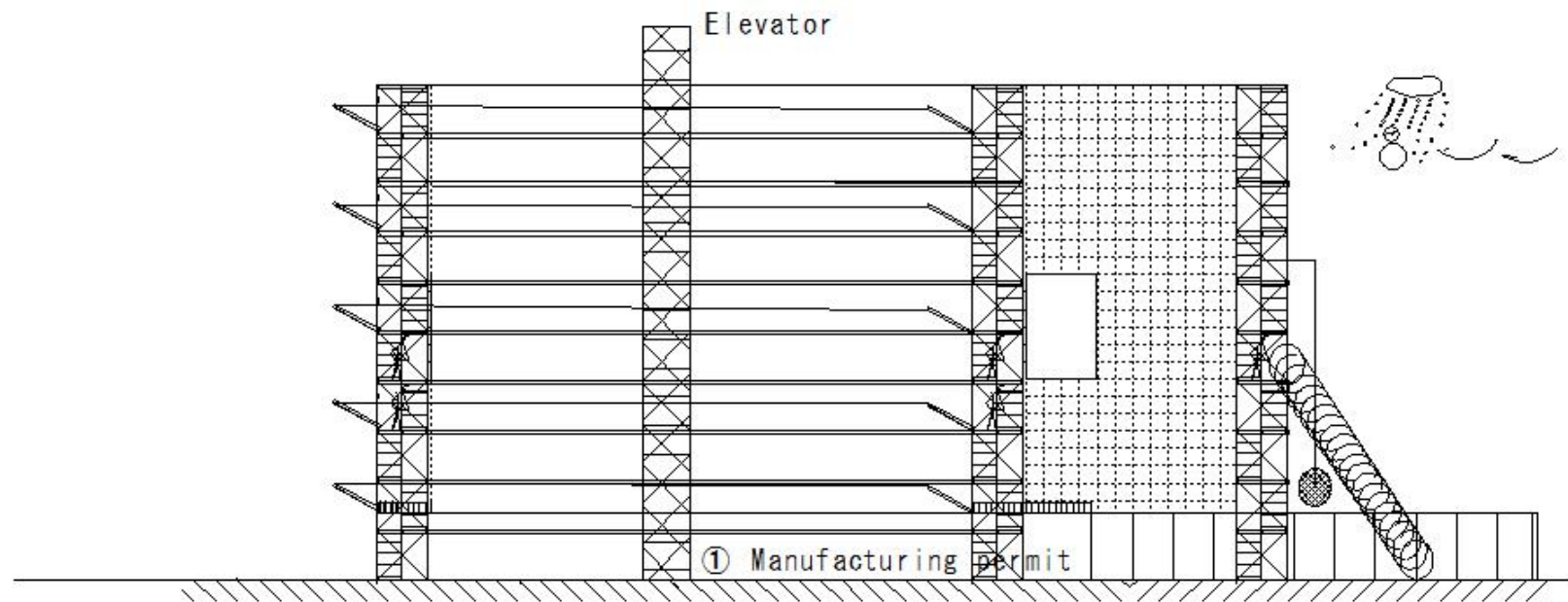
(S404)Elevator safety work

(S404)Elevator safety work

Elevator safety work

① Manufacturing permit required

Load capacity is 1t or more



S227

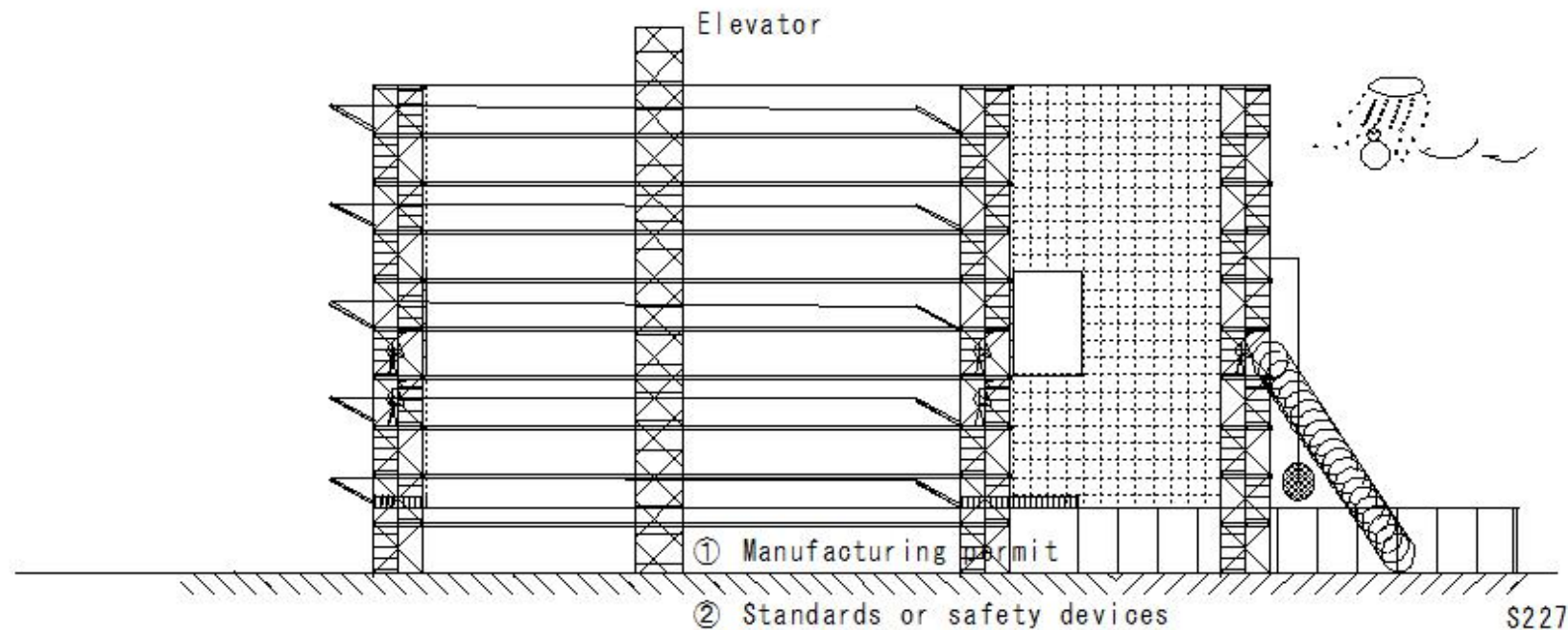
(S405)Elevator safety work

(S405)Elevator safety work

Elevator safety work

② Standards or safety devices required

- Load capacity is 0.25t or more and less than 1t



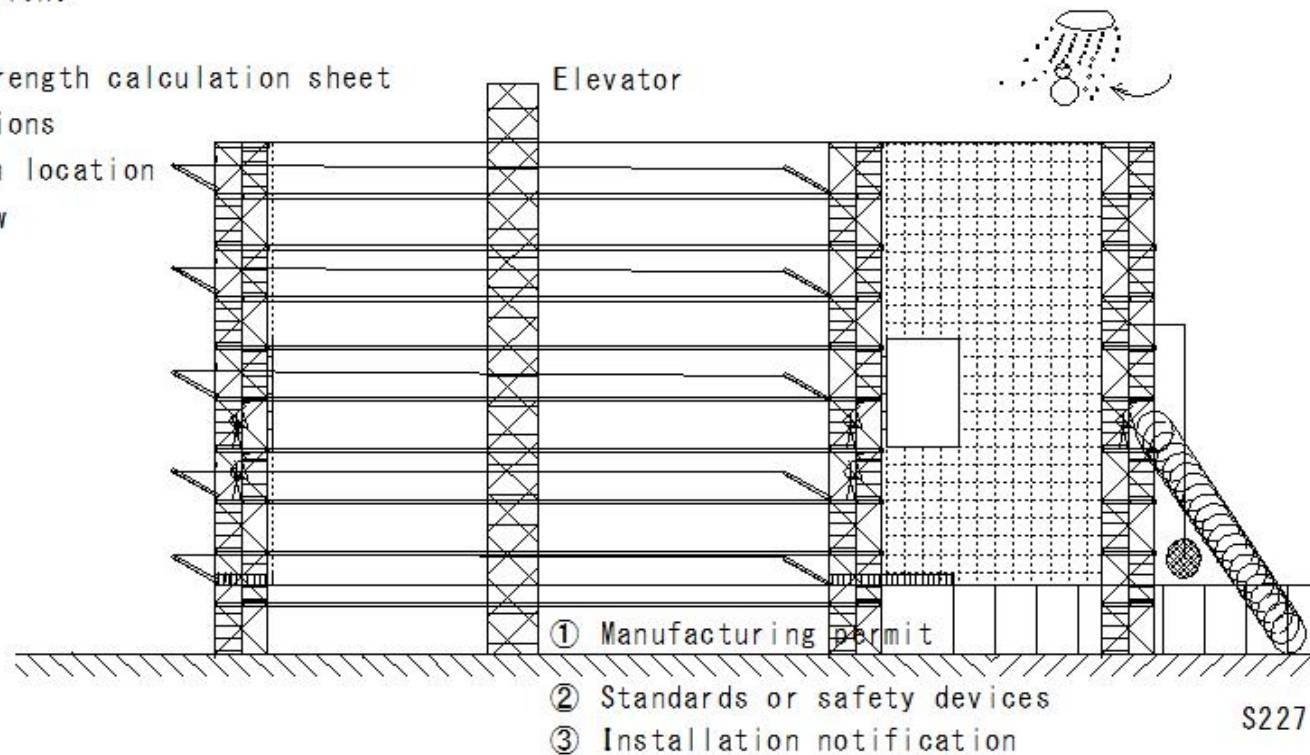
(S406)Elevator safety work

(S406)Elevator safety work

Elevator safety work

③ Installation notification

- Elevator specifications
- Assembly diagram
- Structural part strength calculation sheet
- Surrounding conditions of the installation location
- Foundation overview



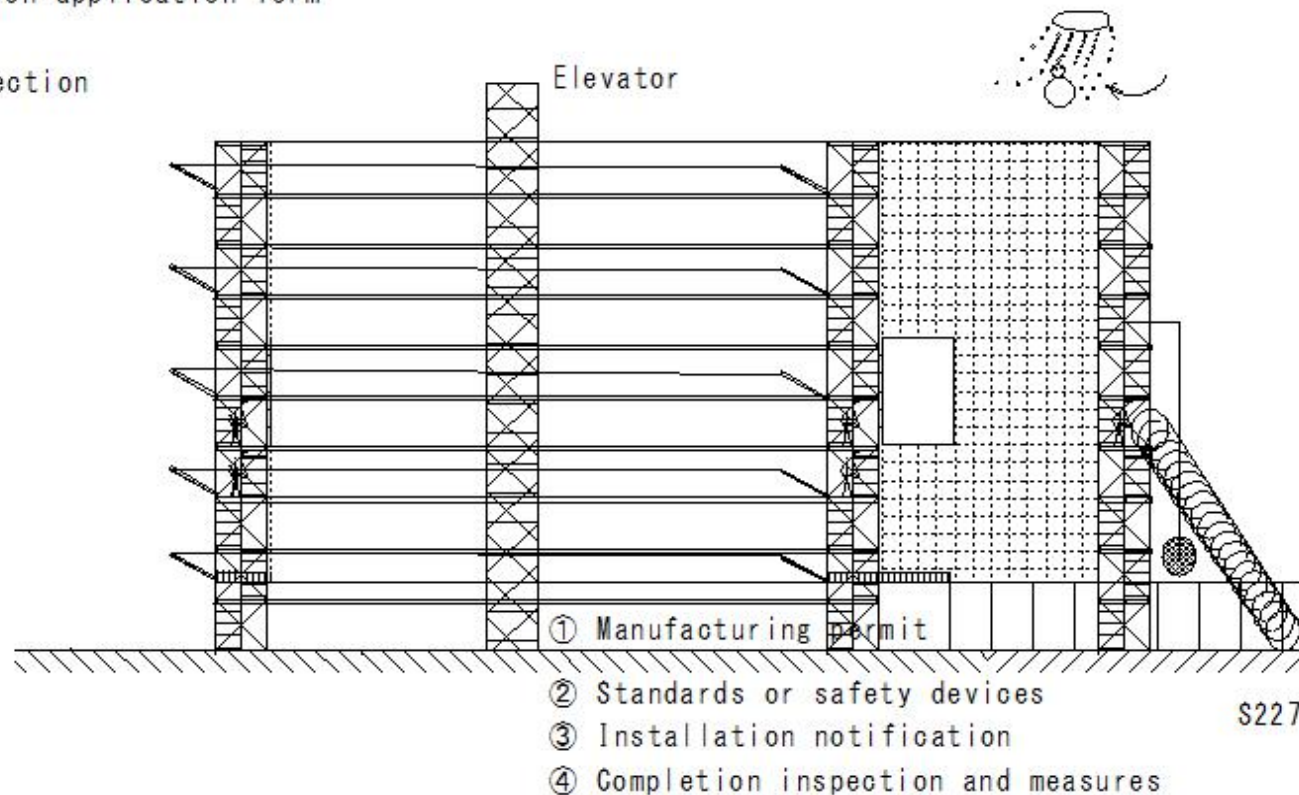
(S407) Elevator safety work

(S407) Elevator safety work

Elevator safety work

④ Completion inspection and measures

- Completion inspection application form
- Load test
- Attendance at inspection

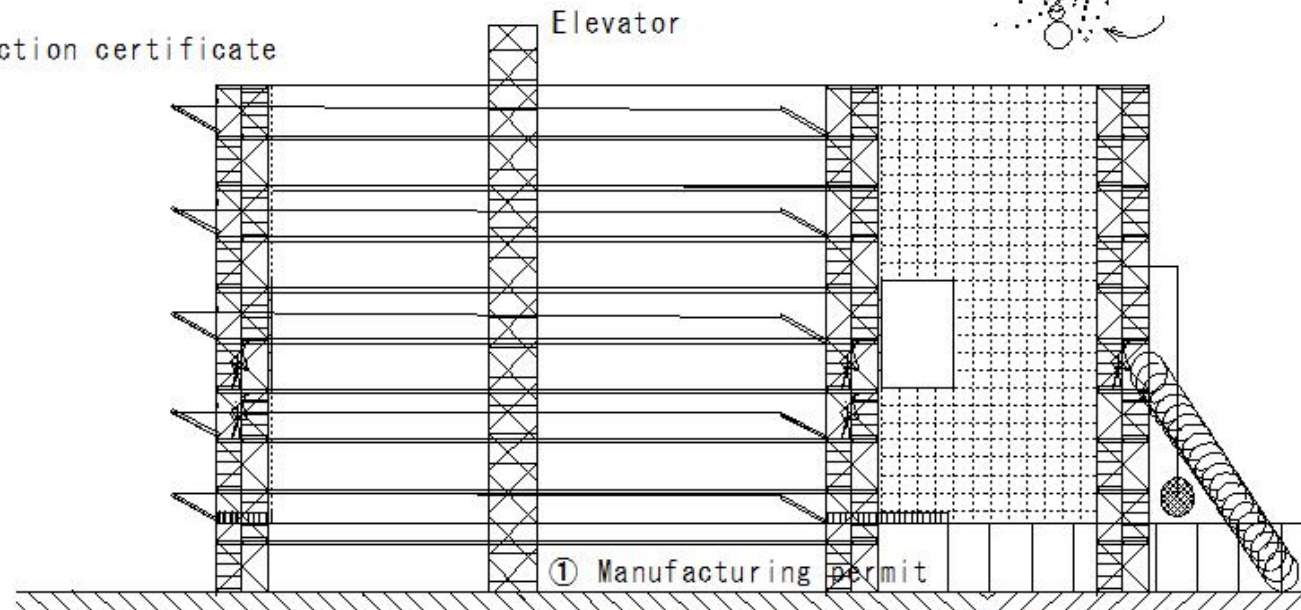


(S408)Elevator safety work

(S408)Elevator safety work

Elevator safety work

⑤ Issuance of inspection certificate



① Manufacturing permit

② Standards or safety devices

③ Installation notification

④ Completion inspection and measures

⑤ Issuance of inspection certificate

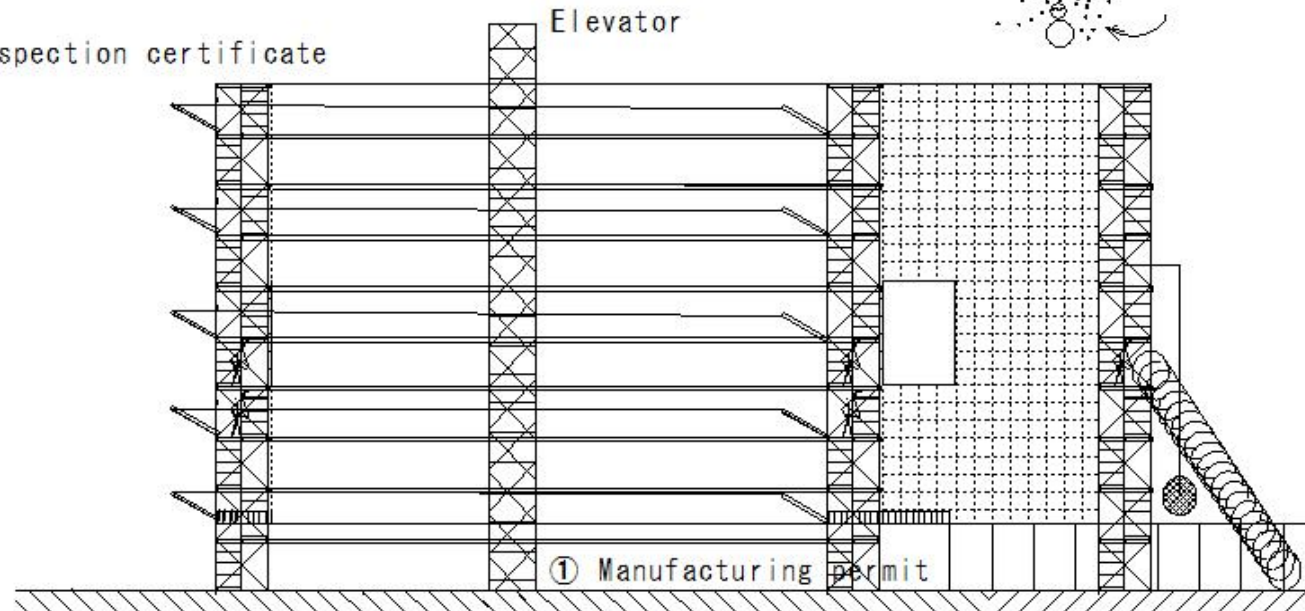
S227

(S409)Elevator safety work

(S409)Elevator safety work

Elevator safety work

⑥ Expiry date of inspection certificate

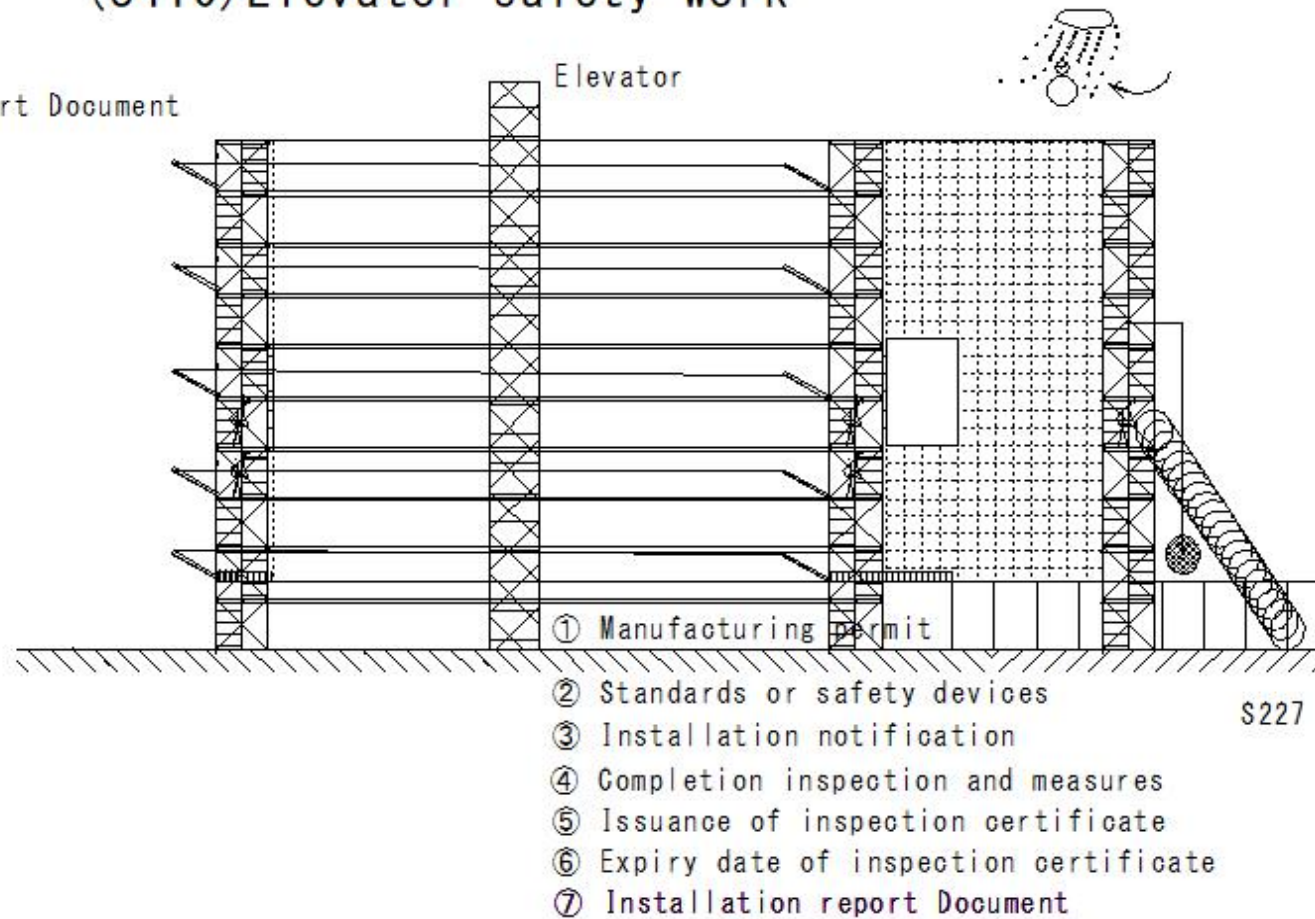


(S410)Elevator safety work

(S410)Elevator safety work

Elevator safety work

⑦ Installation report Document

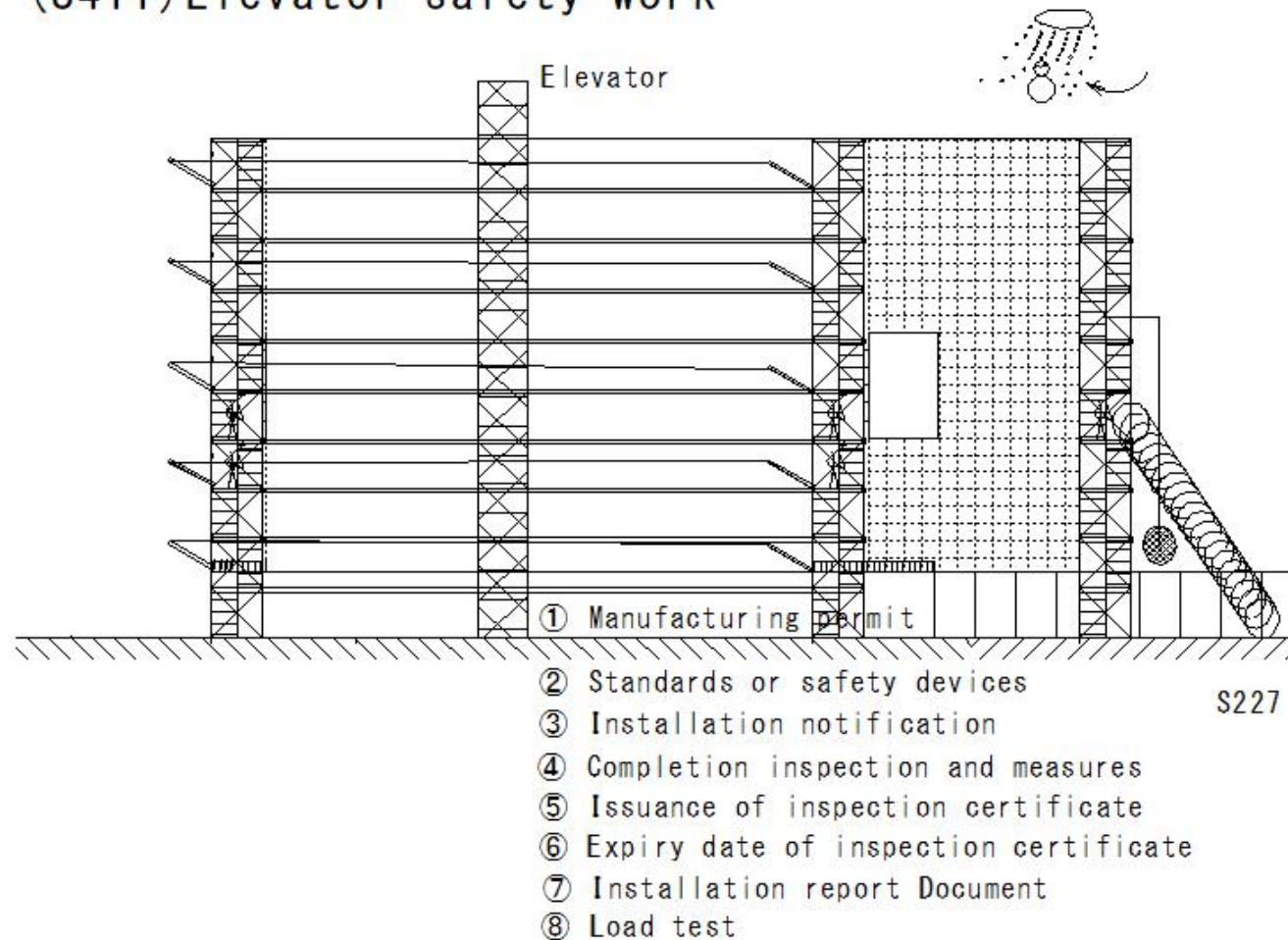


(S411)Elevator safety work

(S411)Elevator safety work

Elevator safety work

⑧ Load test



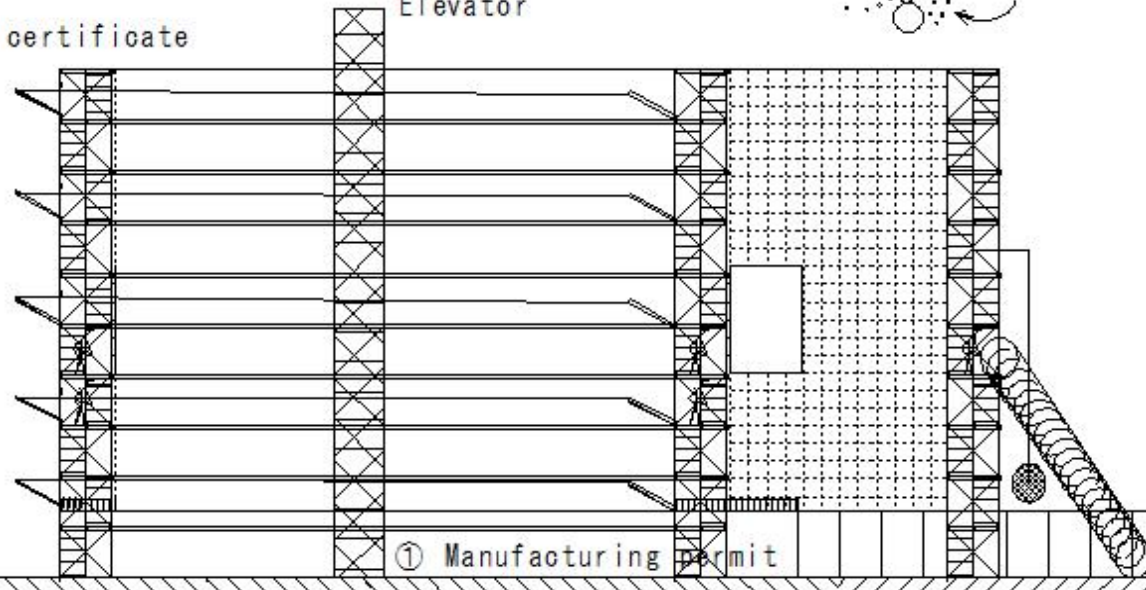
(S412)Elevator safety work

(S412)Elevator safety work

Elevator safety work

⑨ Installation of inspection certificate

Elevator



① Manufacturing permit

⑨ Installation of inspection certificate

② Standards or safety devices

③ Installation notification

④ Completion inspection and measures

⑤ Issuance of inspection certificate

⑥ Expiry date of inspection certificate

⑦ Installation report Document

⑧ Load test

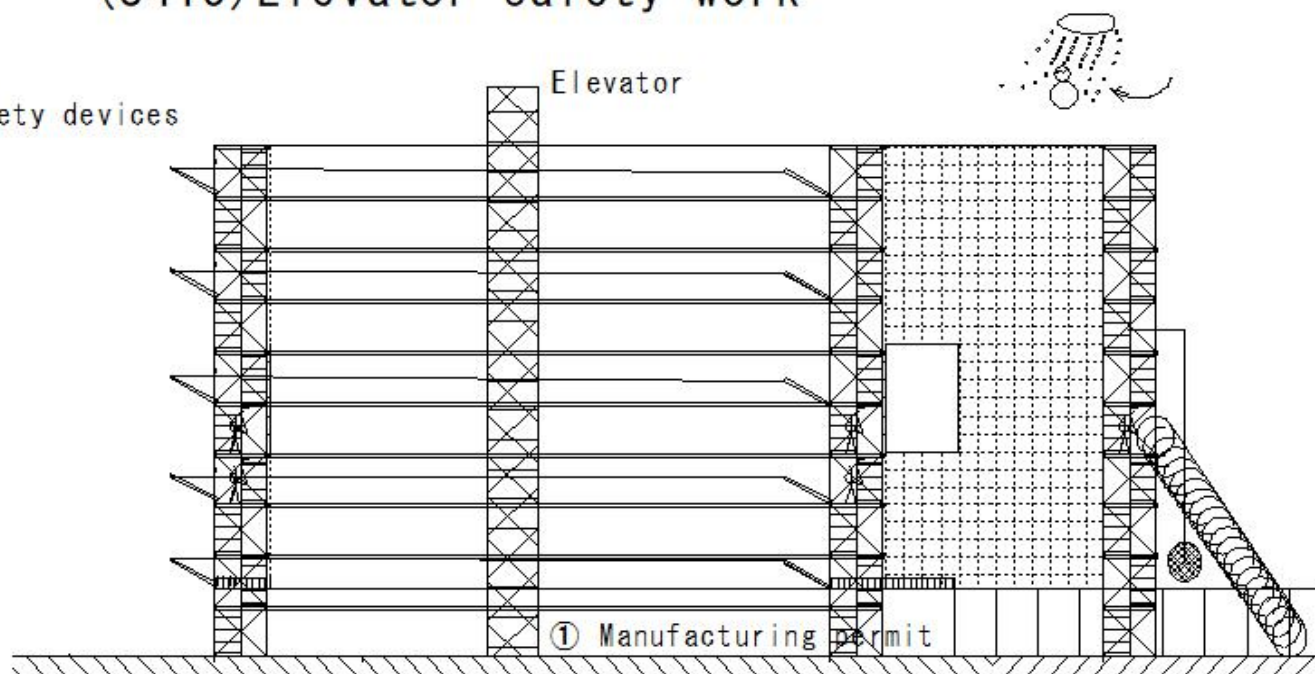
S227

(S413)Elevator safety work

(S413)Elevator safety work

Elevator safety work

⑩ Adjustment of safety devices



⑨ Installation of inspection certificate

⑩ Adjustment of safety devices

② Standards or safety devices

③ Installation notification

④ Completion inspection and measures

⑤ Issuance of inspection certificate

⑥ Expiry date of inspection certificate

⑦ Installation report Document

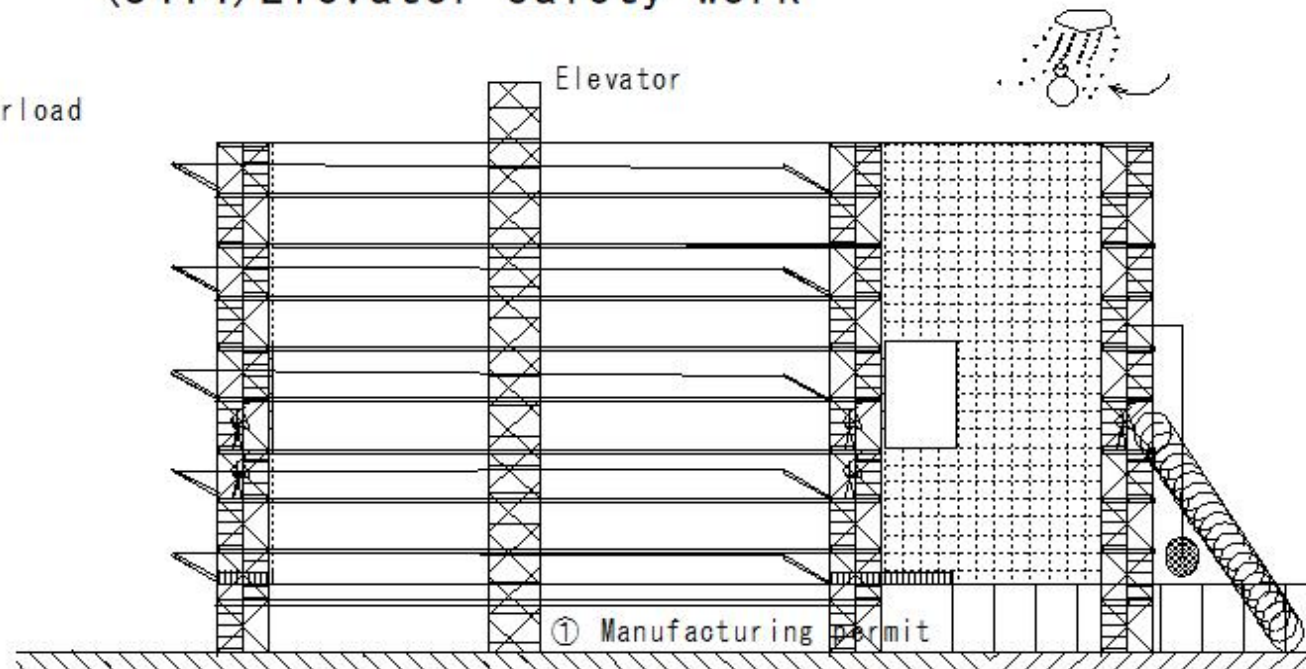
⑧ Load test

(S414)Elevator safety work

(S414)Elevator safety work

Elevator safety work

⑪ Limitation of overload



⑨ Installation of inspection certificate

⑩ Adjustment of safety devices

⑪ Limitation of overload

② Standards or safety devices

③ Installation notification

④ Completion inspection and measures

⑤ Issuance of inspection certificate

⑥ Expiry date of inspection certificate

⑦ Installation report Document

⑧ Load test

S227

(S415)Elevator safety work

(S415)Elevator safety work

Elevator safety work

⑫ Public awareness of operation method

Elevator



① Manufacturing permit

⑨ Installation of inspection certificate

⑩ Adjustment of safety devices

⑪ Limitation of overload

⑫ Public awareness of operation method

② Standards or safety devices

③ Installation notification

④ Completion inspection and measures

⑤ Issuance of inspection certificate

⑥ Expiry date of inspection certificate

⑦ Installation report Document

⑧ Load test

S227

(S416) Elevator safety work

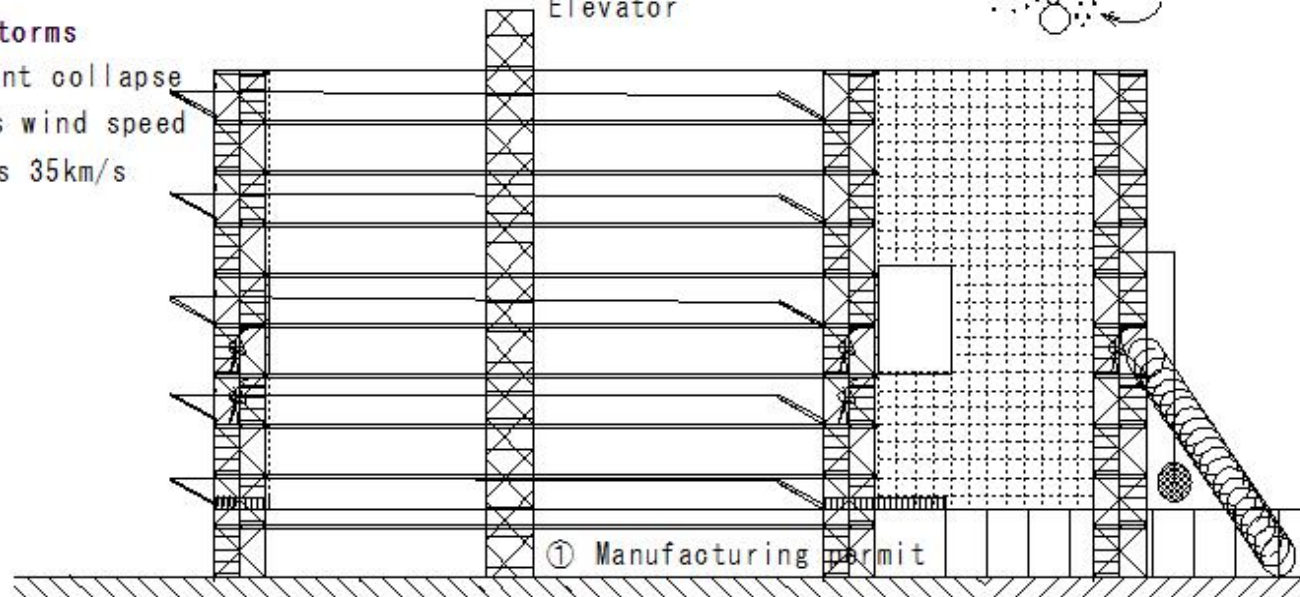
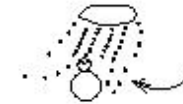
(S416) Elevator safety work

Elevator safety work

⑬ Measures during storms

- Measures to prevent collapse when instantaneous wind speed exceeds 35km/s

Elevator



① Manufacturing ~~permit~~

- ⑨ Installation of inspection certificate
- ⑩ Adjustment of safety devices
- ⑪ Limitation of overload
- ⑫ Public awareness of operation method
- ⑬ Measures during storms

- ② Standards or safety devices
- ③ Installation notification
- ④ Completion inspection and measures
- ⑤ Issuance of inspection certificate
- ⑥ Expiry date of inspection certificate
- ⑦ Installation report Document
- ⑧ Load test

\$227

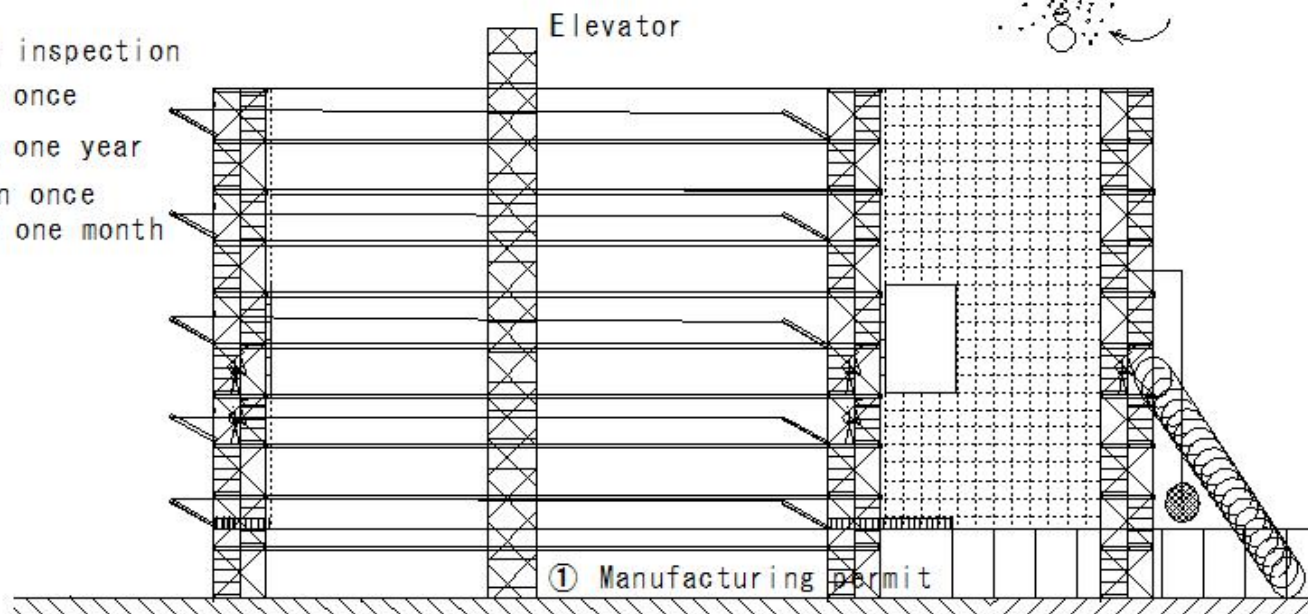
(S417)Elevator safety work

(S417)Elevator safety work

Elevator safety work

⑭ Regular voluntary inspection

- Annual inspection once
within one year
- Monthly inspection once
within one month



⑨ Installation of inspection certificate

⑩ Adjustment of safety devices

⑪ Limitation of overload

⑫ Public awareness of operation method

⑬ Measures during storms

⑭ Regular voluntary inspection

② Standards or safety devices

③ Installation notification

④ Completion inspection and measures

⑤ Issuance of inspection certificate

⑥ Expiry date of inspection certificate

⑦ Installation report Document

⑧ Load test

S227

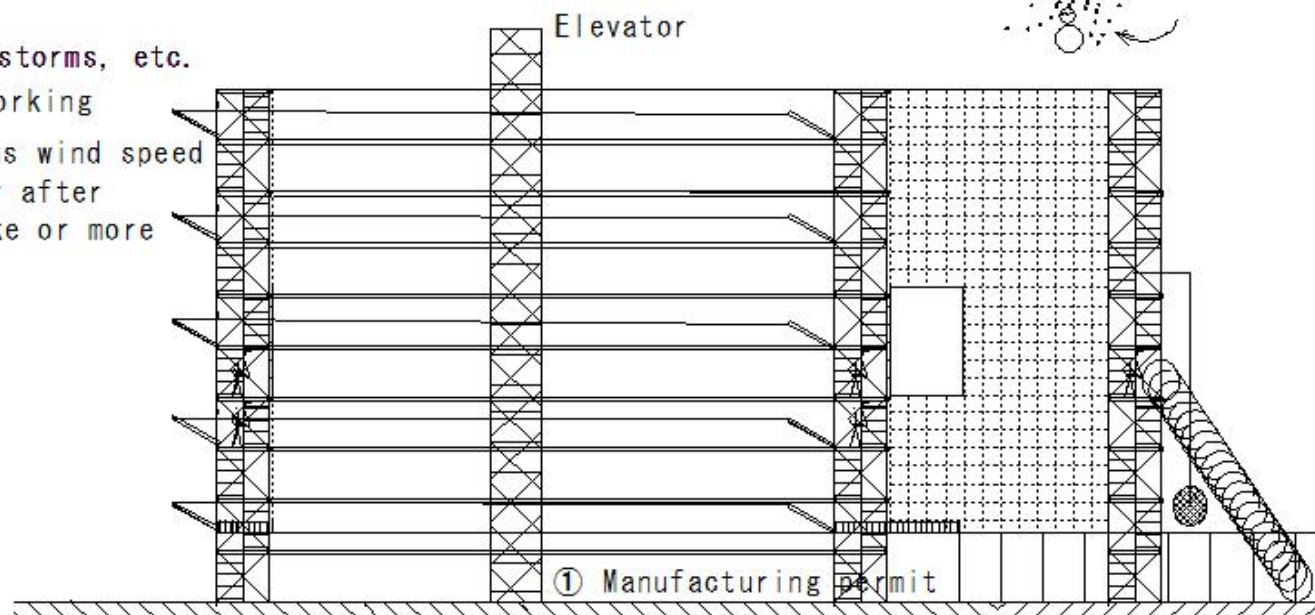
(S418)Elevator safety work

(S418)Elevator safety work

Elevator safety work

⑮ Inspection after storms, etc.

- Inspection when working after instantaneous wind speed of 30km/s or after moderate earthquake or more

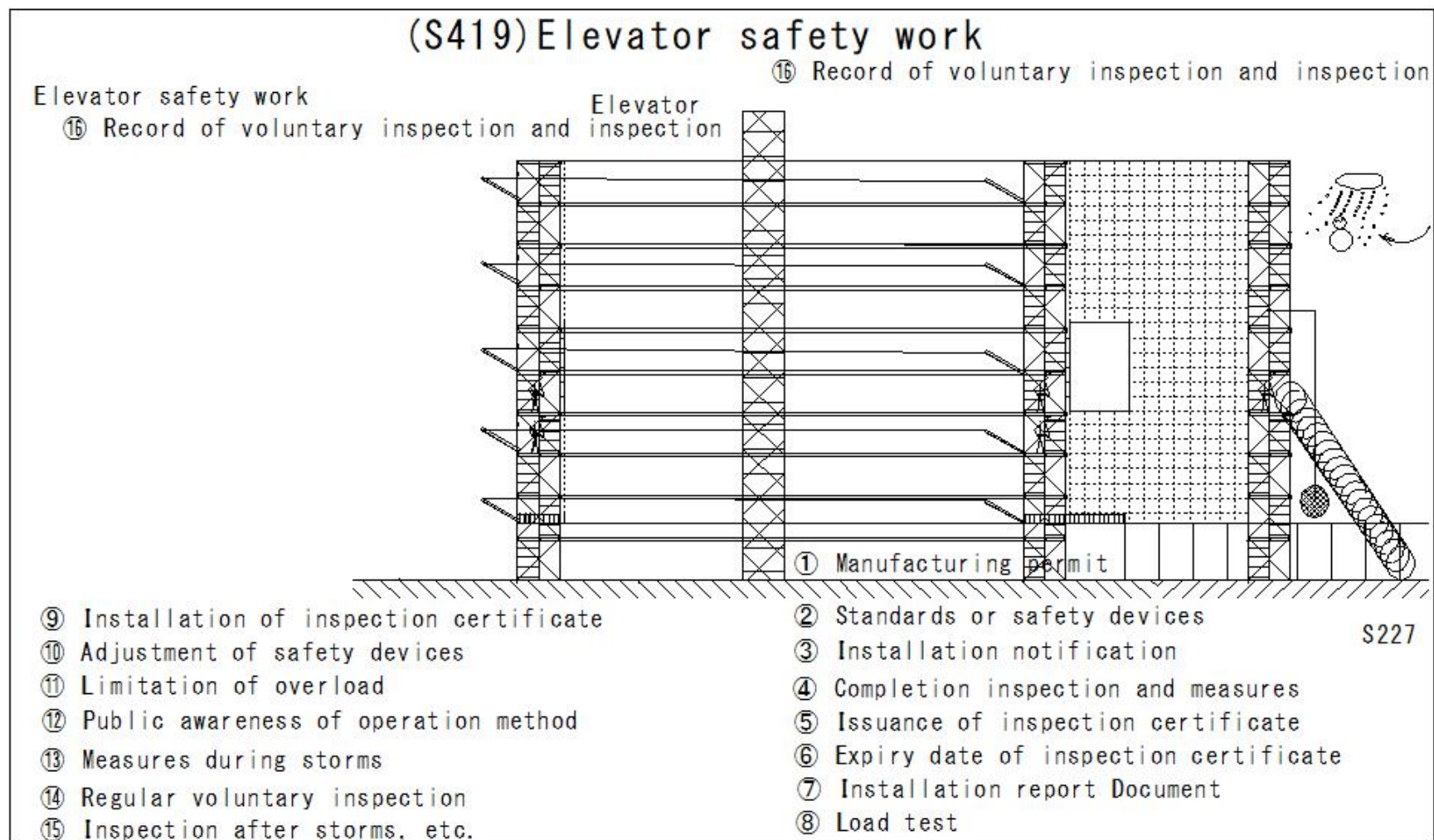


- ⑨ Installation of inspection certificate
- ⑩ Adjustment of safety devices
- ⑪ Limitation of overload
- ⑫ Public awareness of operation method
- ⑬ Measures during storms
- ⑭ Regular voluntary inspection
- ⑮ Inspection after storms, etc.

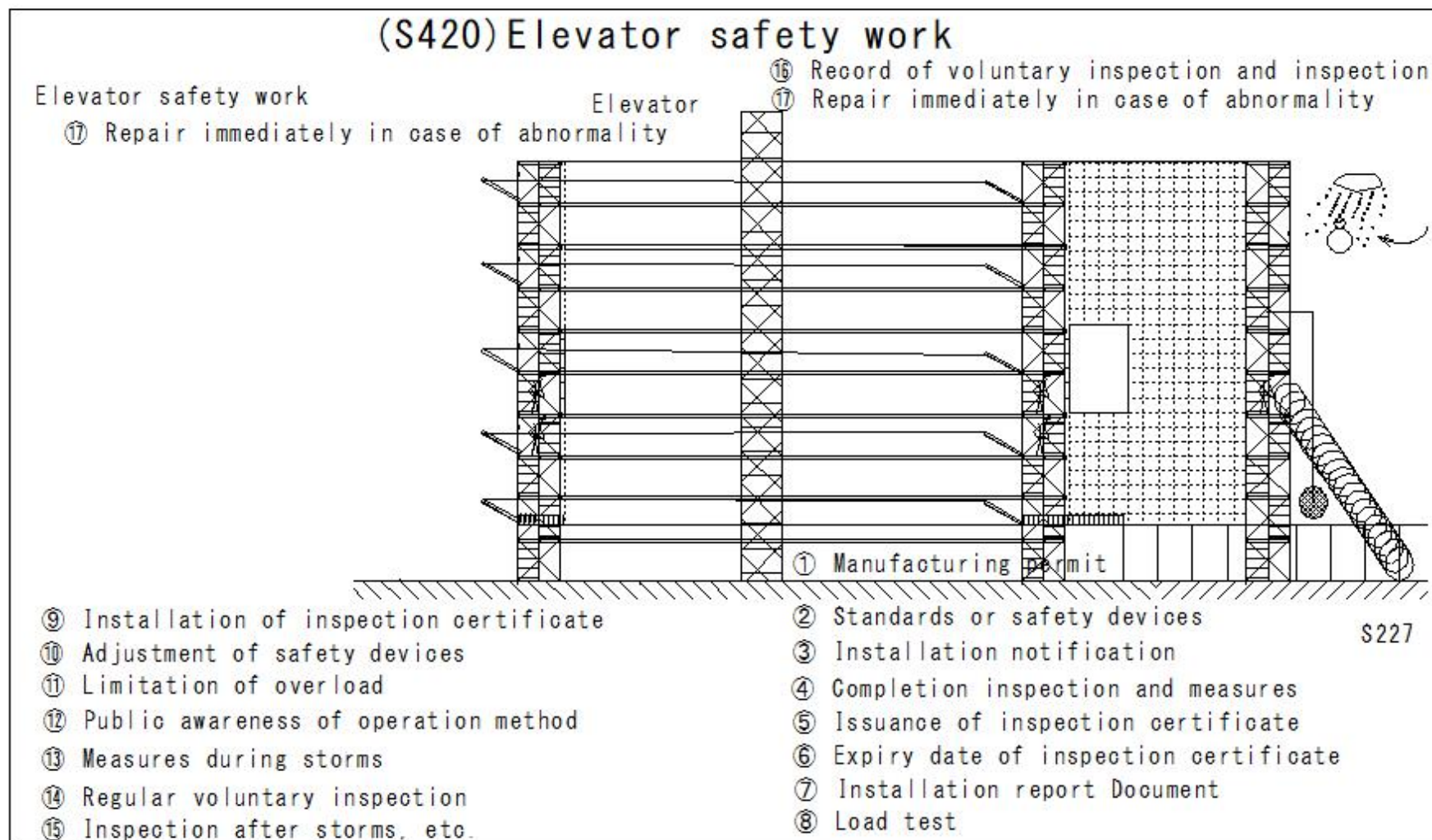
- ① Manufacturing permit
- ② Standards or safety devices
- ③ Installation notification
- ④ Completion inspection and measures
- ⑤ Issuance of inspection certificate
- ⑥ Expiry date of inspection certificate
- ⑦ Installation report Document
- ⑧ Load test

S227

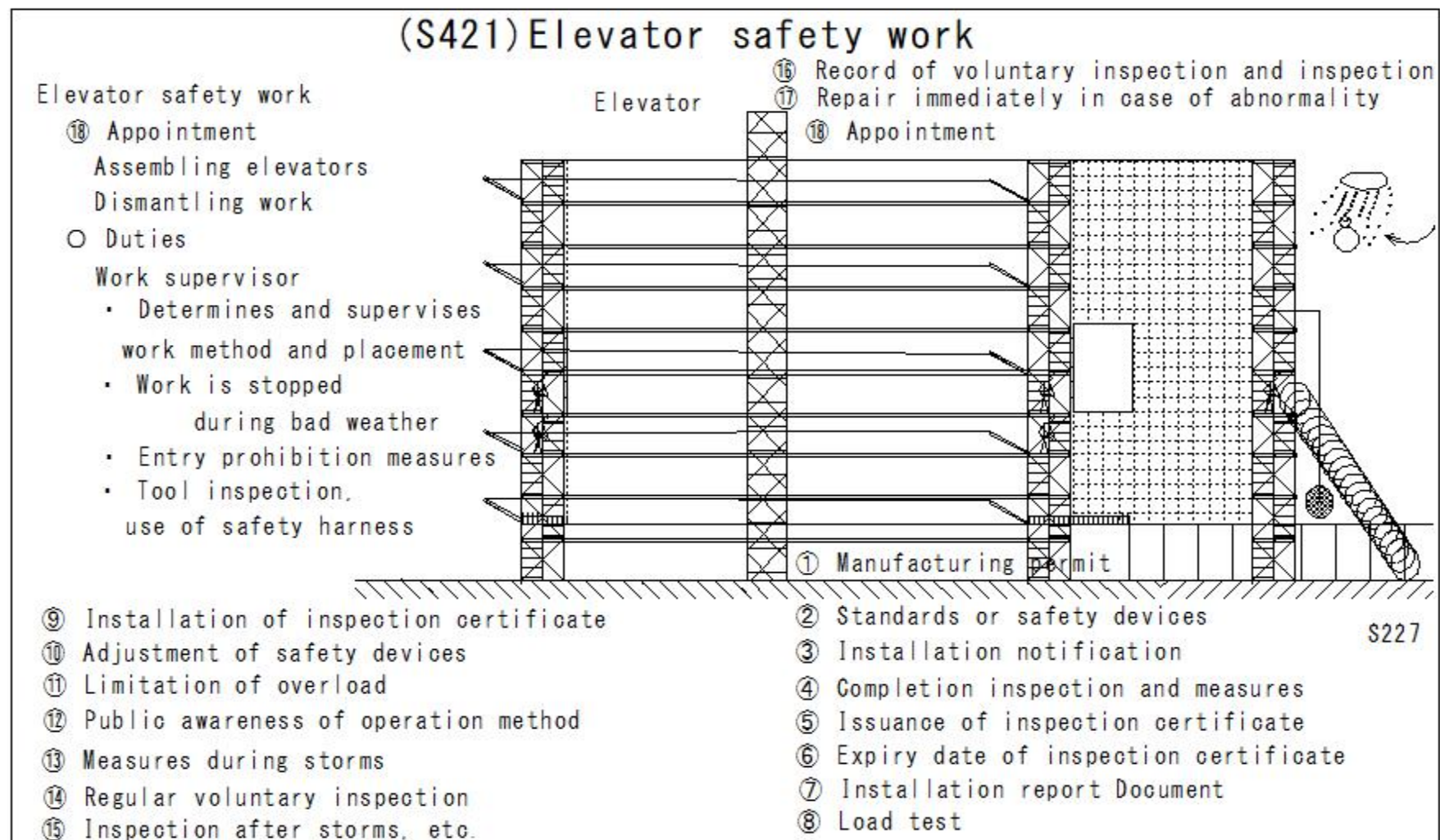
(S419)Elevator safety work



(S420)Elevator safety work



(S421) Elevator safety work

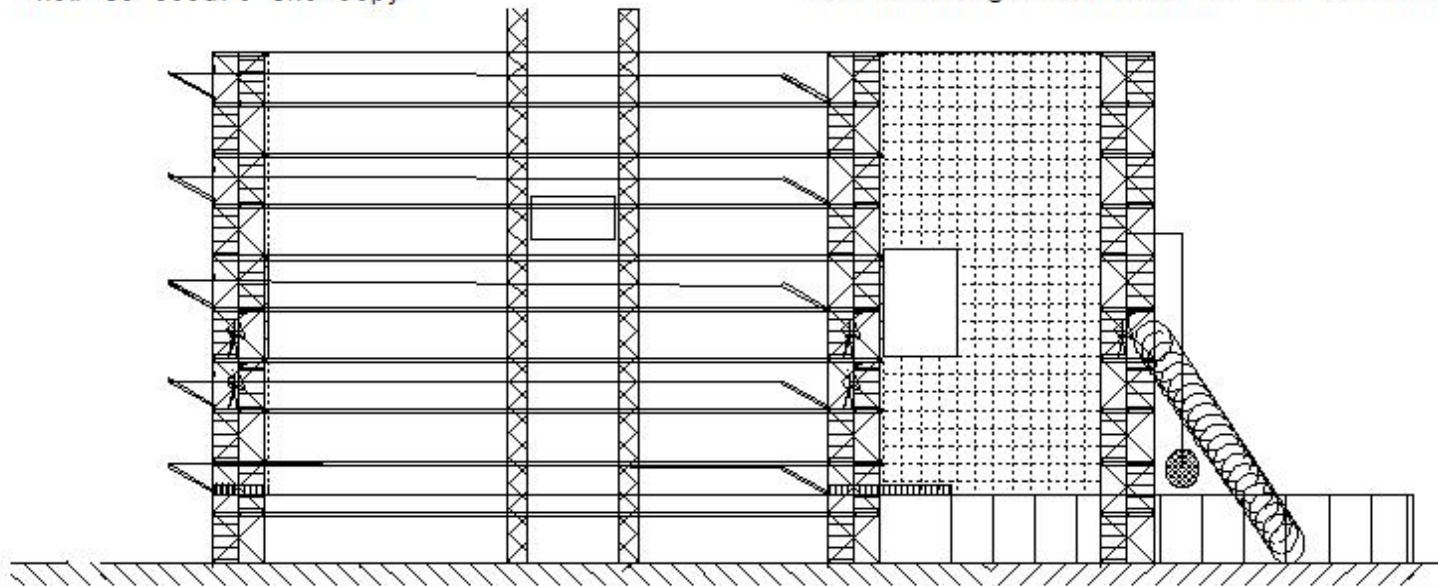


(S422) Safe operation of construction lifts

(S422) Safe operation of construction lifts

Safe operation of construction lifts

- Classification by use and structure
- ① Installation notification
 - Guide rail height 18m or more (excluding loads less than 0.25t)
- Installation notification
 - Construction lift installation notification
 - Construction lift specifications
 - How to secure the copy
 - Assembly diagram of the construction lift
 - Strength calculation sheet for structural parts
 - Surrounding conditions of the installation site

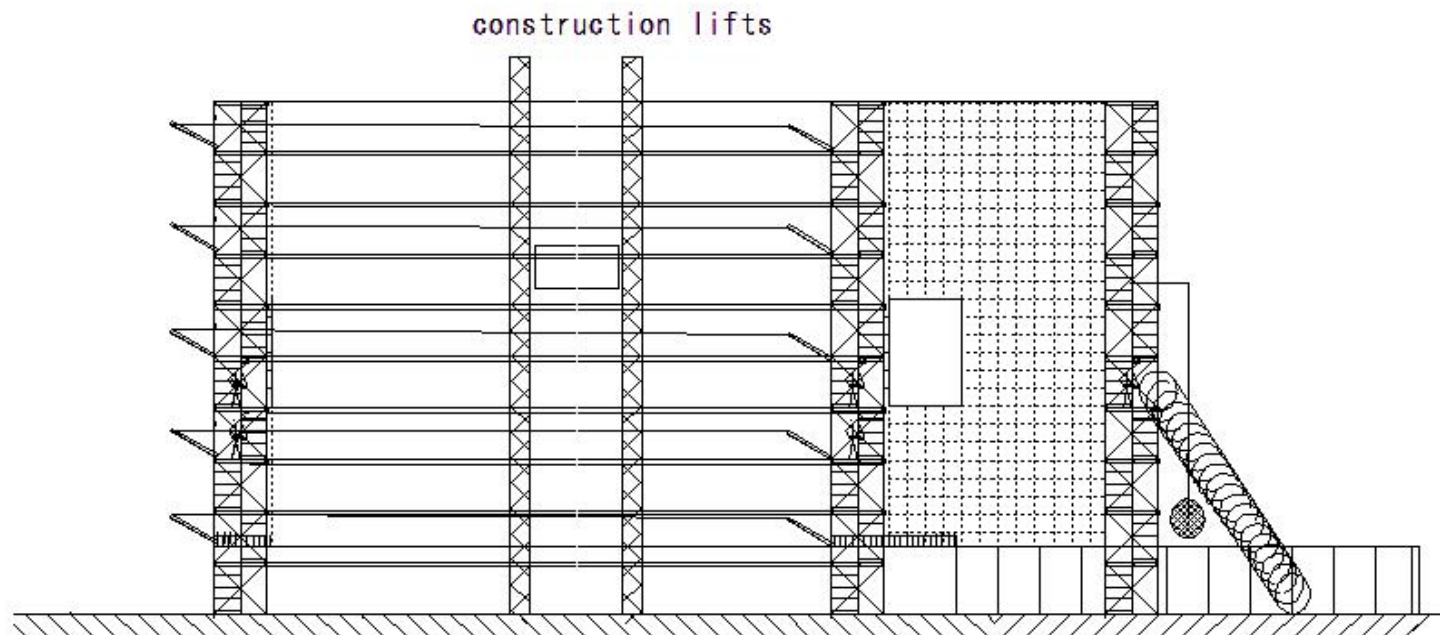


(S423) Safe operation of construction lifts

(S423) Safe operation of construction lifts

Safe operation of construction lifts

② Completion inspection and measures

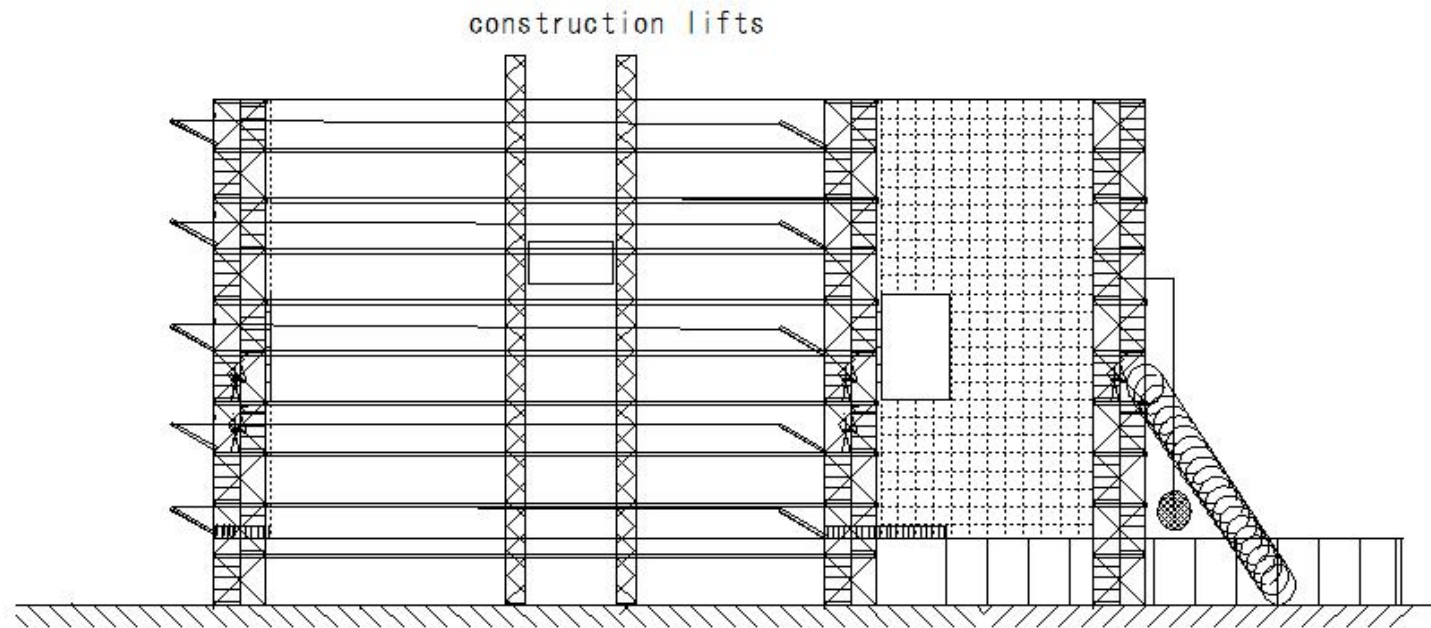


(S424) Safe operation of construction lifts

(S424) Safe operation of construction lifts

Safe operation of construction lifts

③ Issuance of inspection certificate



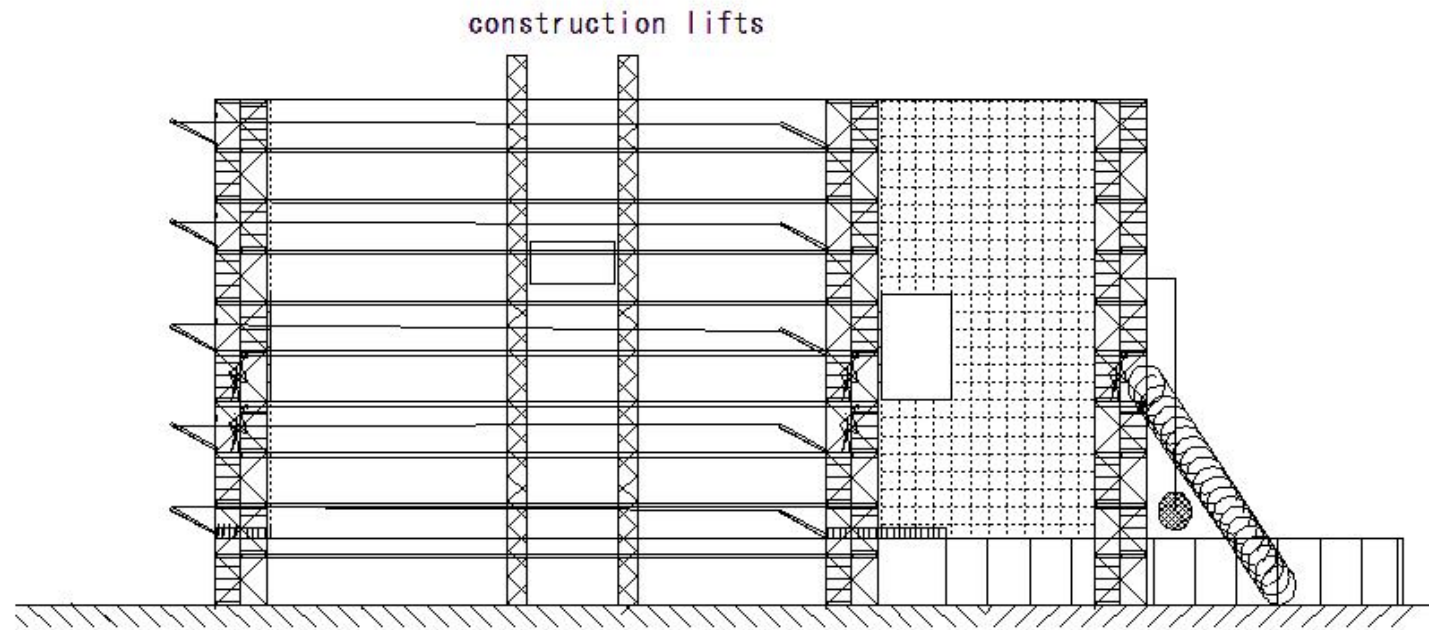
(S425) Safe operation of construction lifts

(S425) Safe operation of construction lifts

Safe operation of construction lifts

④ Validity period of inspection certificate

- From installation to decommissioning

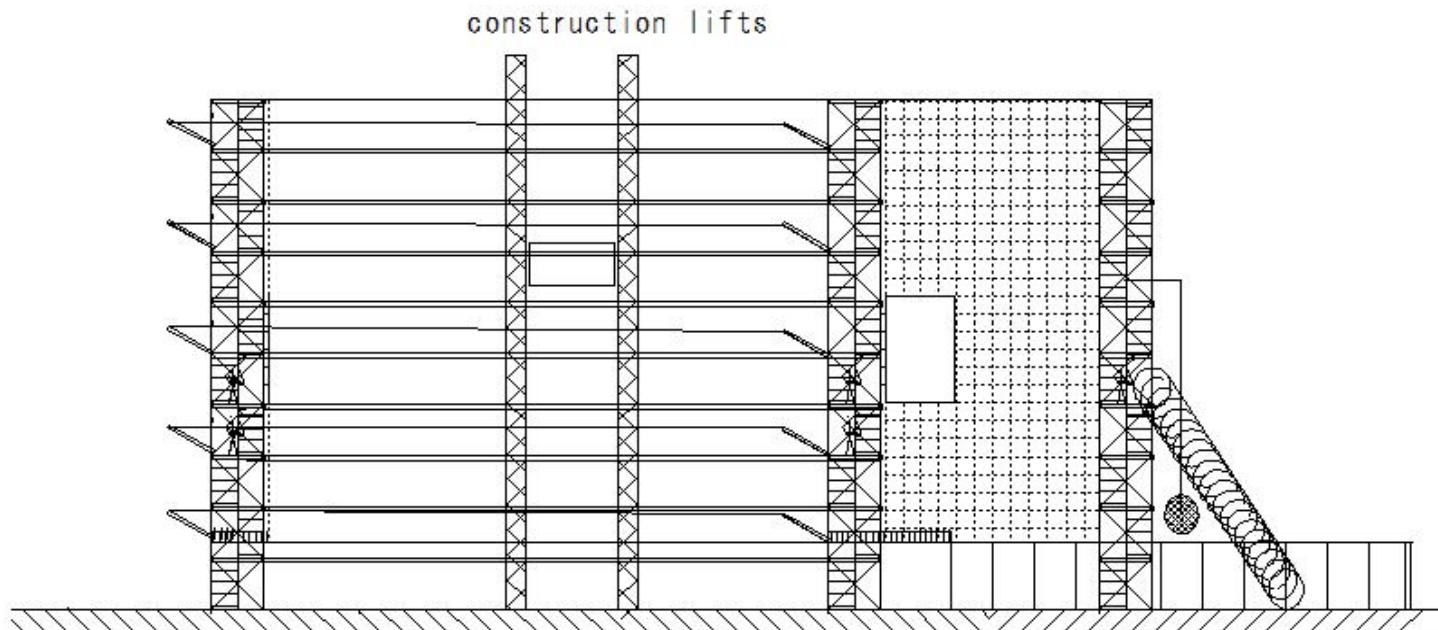


(S426) Safe operation of construction lifts

(S426) Safe operation of construction lifts

Safe operation of construction lifts

⑤ Installation of inspection certificate



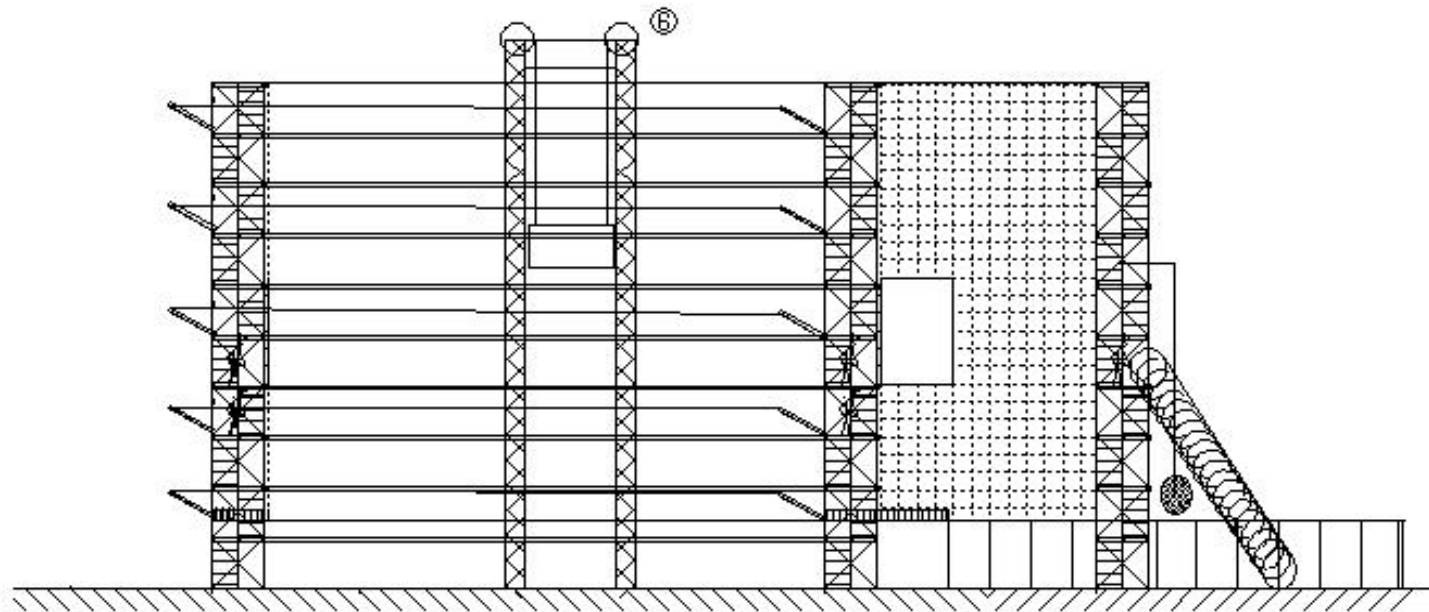
(S427) Safe operation of construction lifts

(S427) Safe operation of construction lifts

Safe operation of construction lifts

Ⓑ Prevention of overwinding

construction lifts



(S428) Safe operation of construction lifts

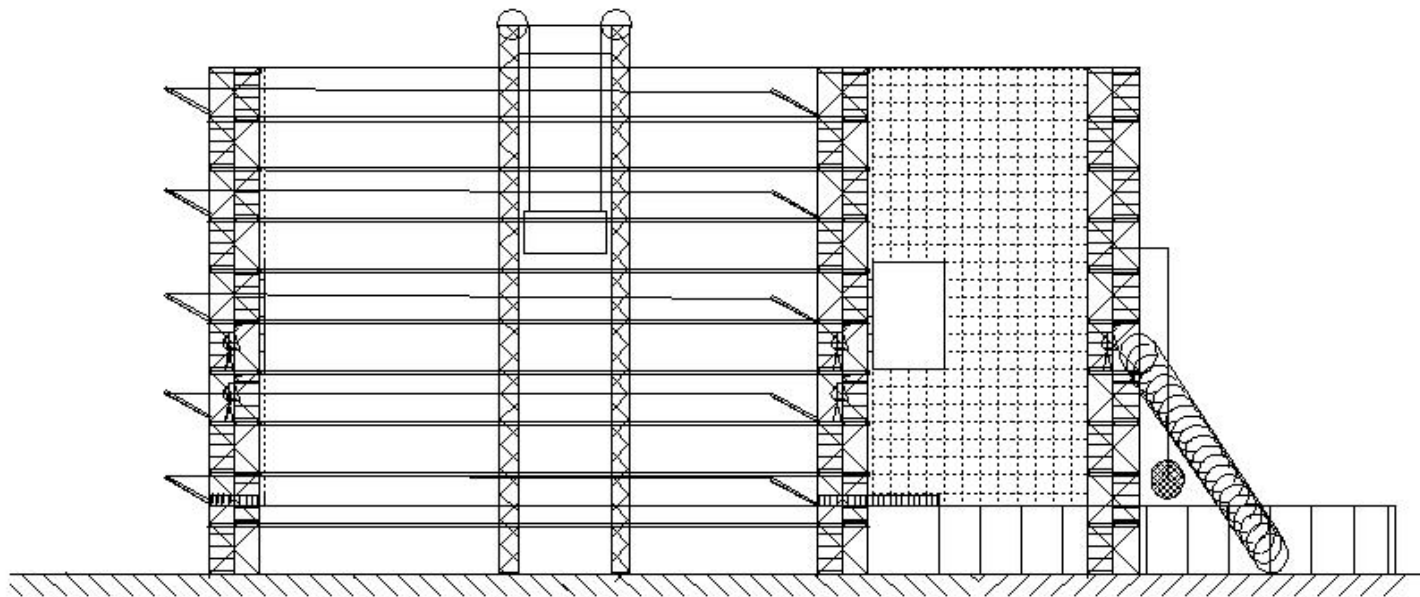
(S428) Safe operation of construction lifts

Safe operation of construction lifts

⑦ Operation qualifications

- Loads of 0.25t or more...Special training course completion

construction lifts



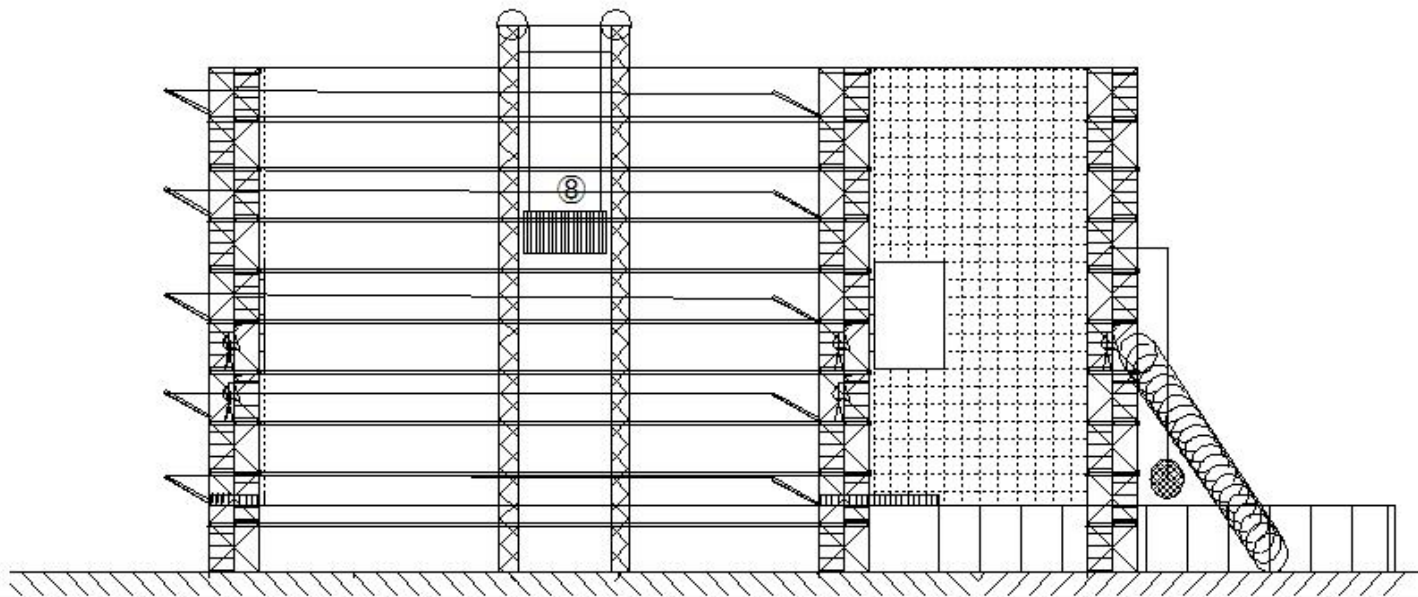
(S429) Safe operation of construction lifts

(S429) Safe operation of construction lifts

Safe operation of construction lifts

⑧ Overload restrictions

construction lifts



(S430) Safe operation of construction lifts

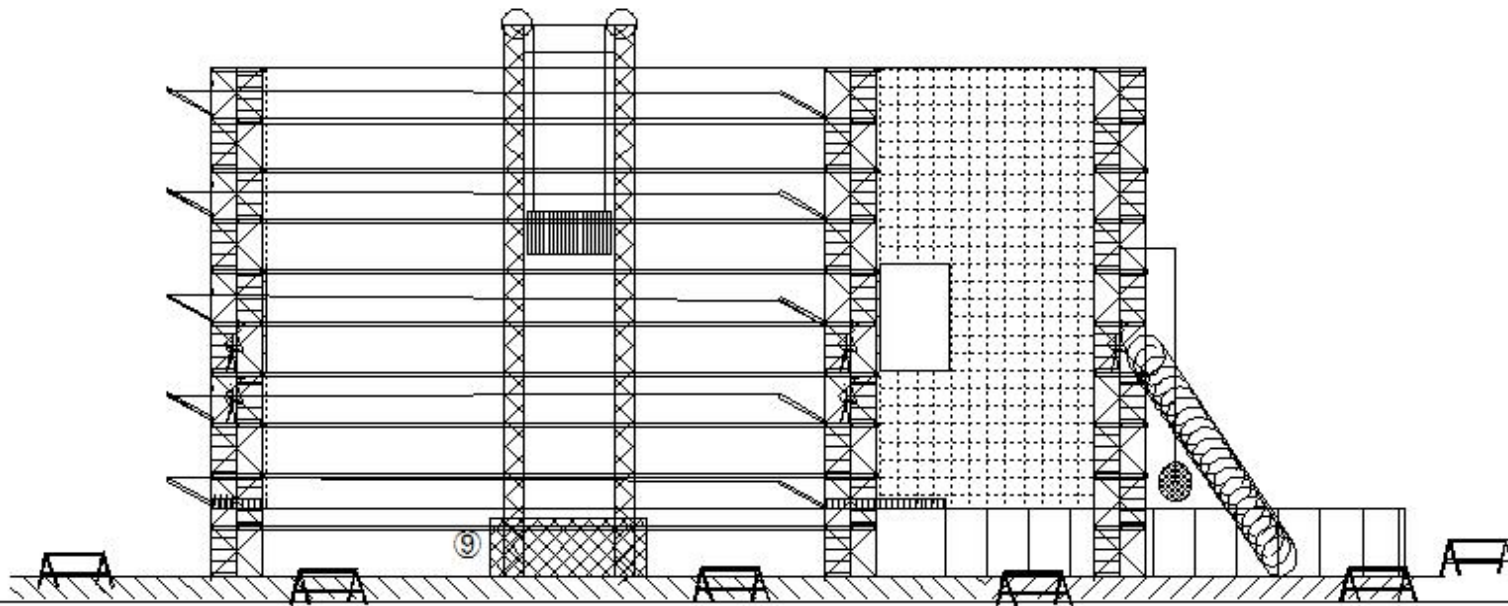
(S430) Safe operation of construction lifts

Safe operation of construction lifts

⑨ No entry

- Dangerous areas caused by raising and lowering the carrier
- Winding wire rope Inner corner of the pit

construction lifts



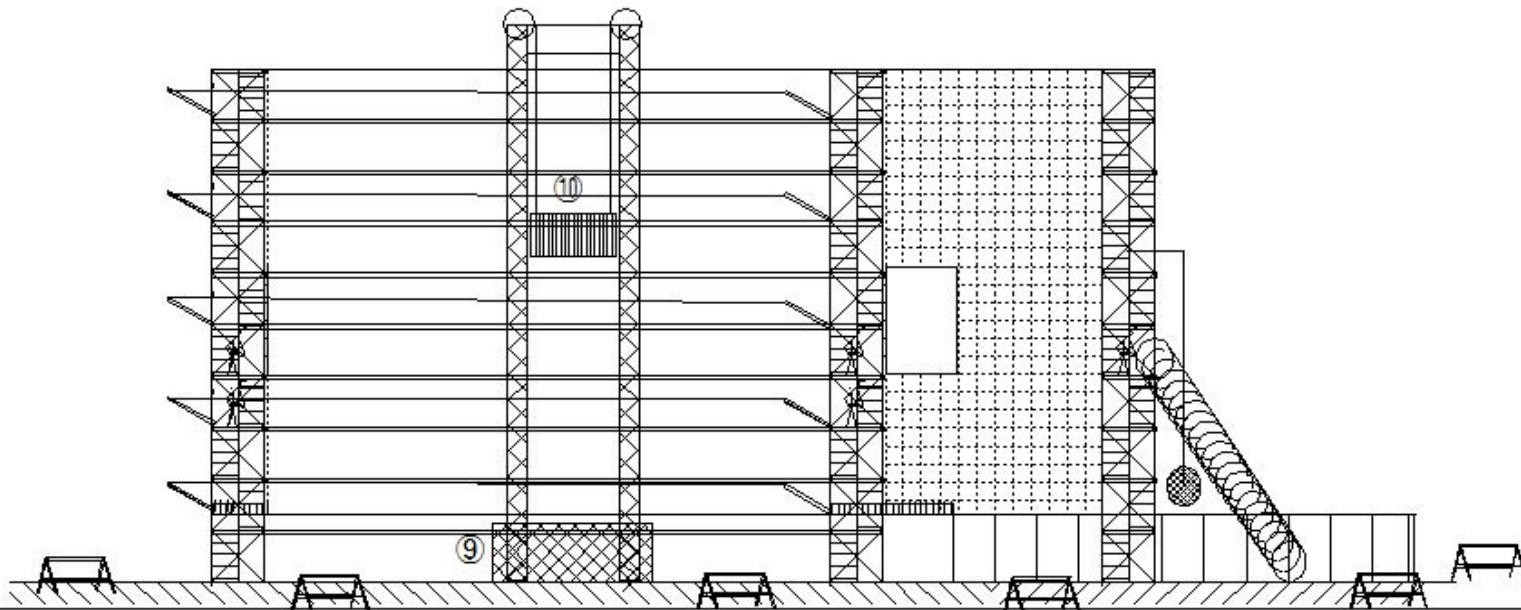
(S431) Safe operation of construction lifts

(S431) Safe operation of construction lifts

Safe operation of construction lifts

- ⑩ Measures in case of cleaning pits, etc.
- Measures to prevent the risk of the carrier falling

construction lifts



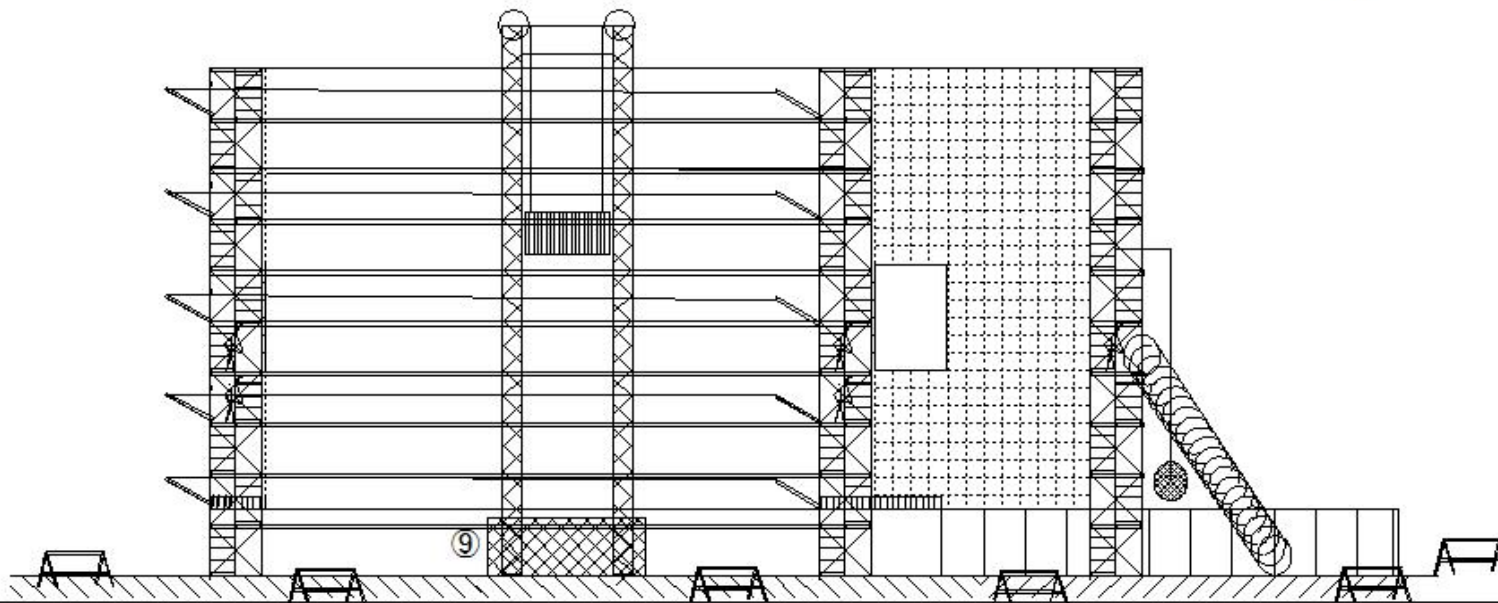
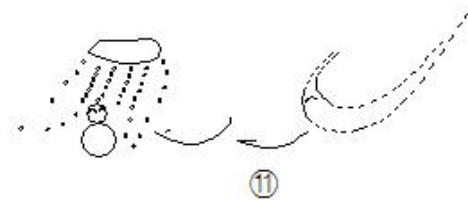
(S432) Safe operation of construction lifts

(S432) Safe operation of construction lifts

Safe operation of construction lifts

⑪ Measures during storms

construction lifts



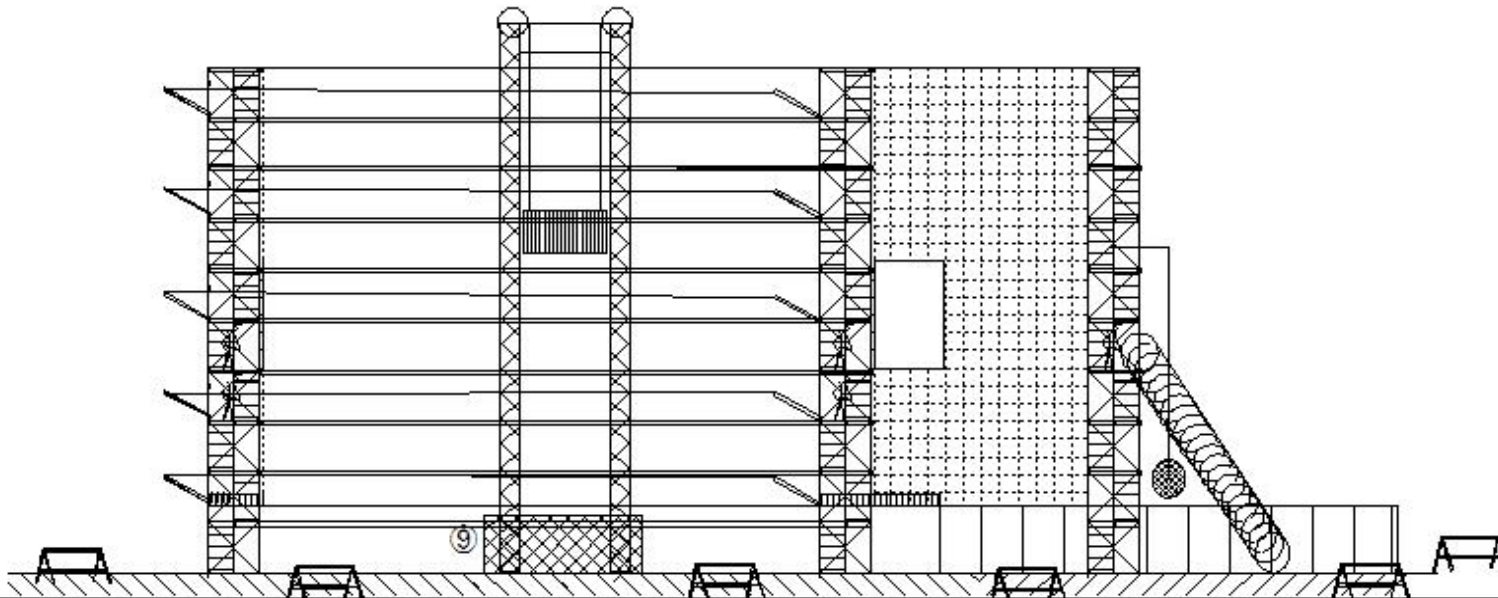
(S433) Safe operation of construction lifts

(S433) Safe operation of construction lifts

Safe operation of construction lifts

- ⑫ Regular voluntary inspections, etc.
 - Monthly inspection once every month... kept for 3 years
 - Inspection before work begins

construction lifts



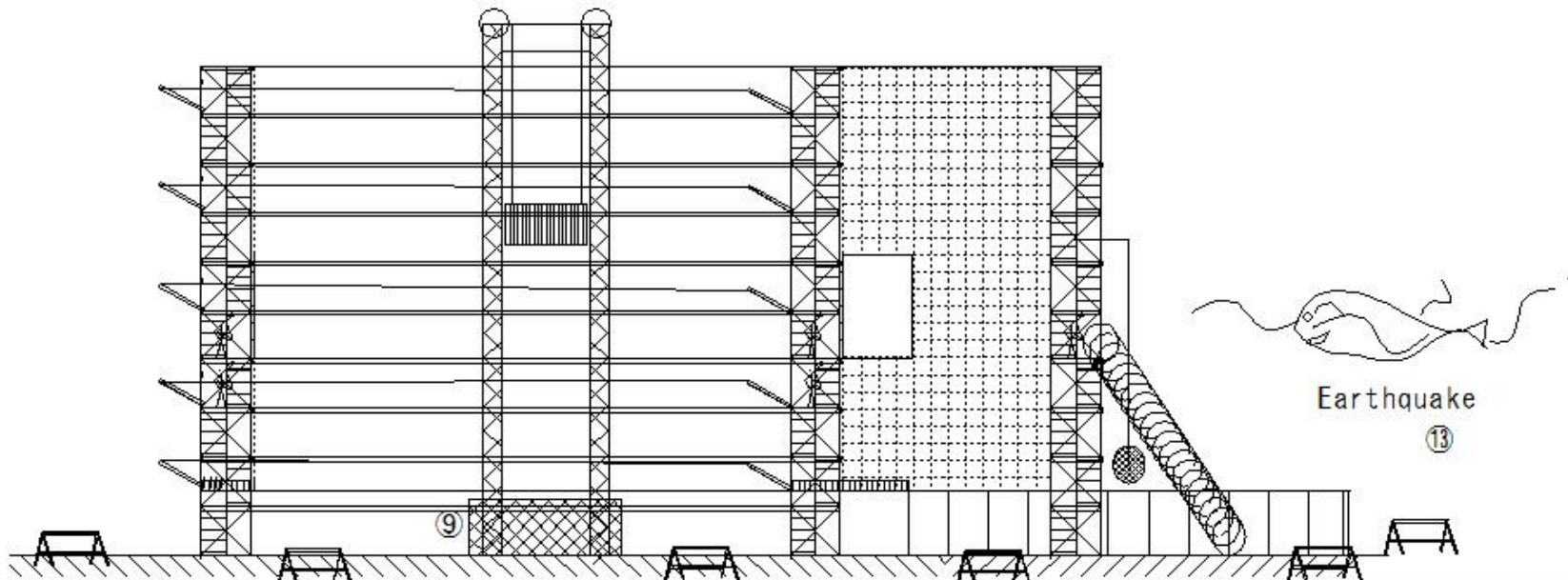
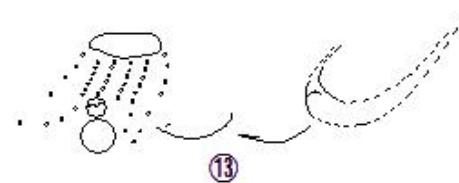
(S434) Safe operation of construction lifts

(S434) Safe operation of construction lifts

Safe operation of construction lifts

⑬ Inspection for storms and earthquakes

- Inspection after storms: instantaneous wind speed of 30m/s or more and moderate earthquakes: seismic intensity of 4 or more

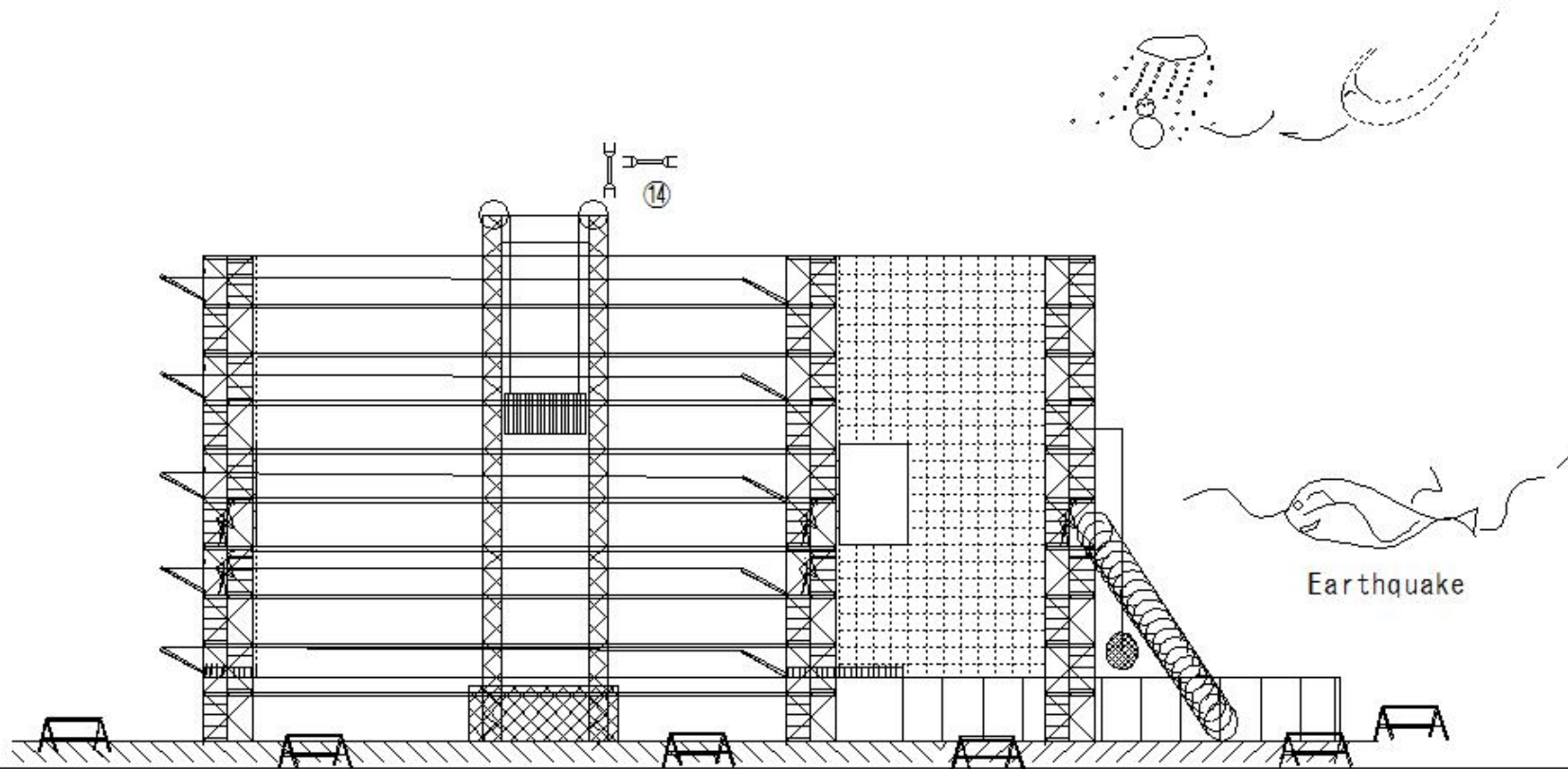


(S435) Safe operation of construction lifts

(S435) Safe operation of construction lifts

Safe operation of construction lifts

- ⑭ Repairs immediately in the event of an abnormality



(S436) Safe operation of construction lifts

(S436) Safe operation of construction lifts

Safe operation of construction lifts

⑮ Appointment – Appointment of work supervisor for assembly and disassembly

Work supervisor

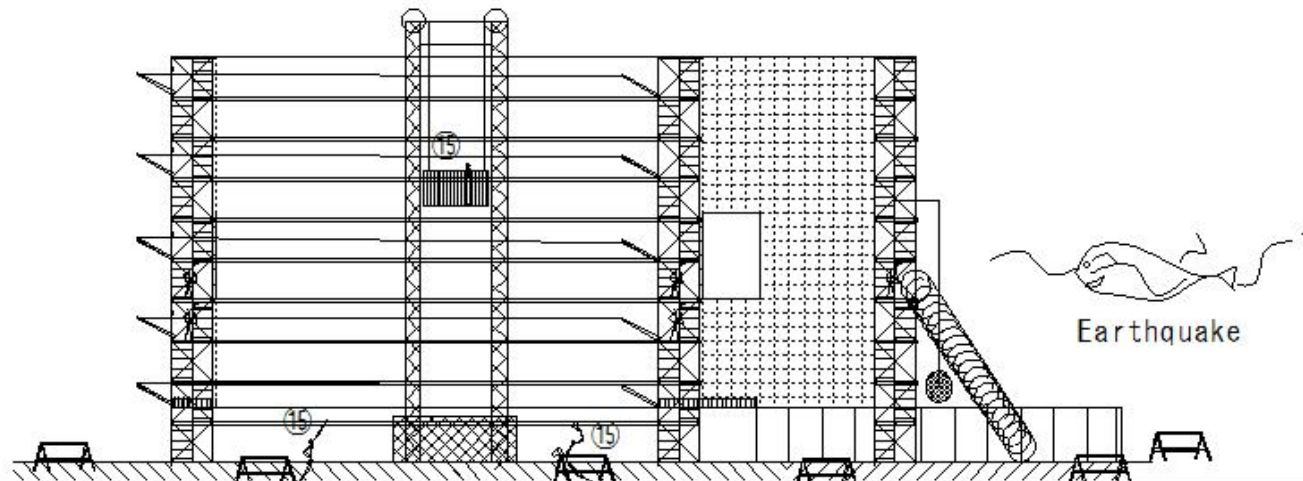
Duties

- Determine and supervise work methods and placement
- Inspect equipment and tools, remove defective items

Driver – Appointment: Appointment of signal person

Signal person

- No boarding the carrier except for repairs, inspections, etc.
- No leaving the driving position with the carrier raised



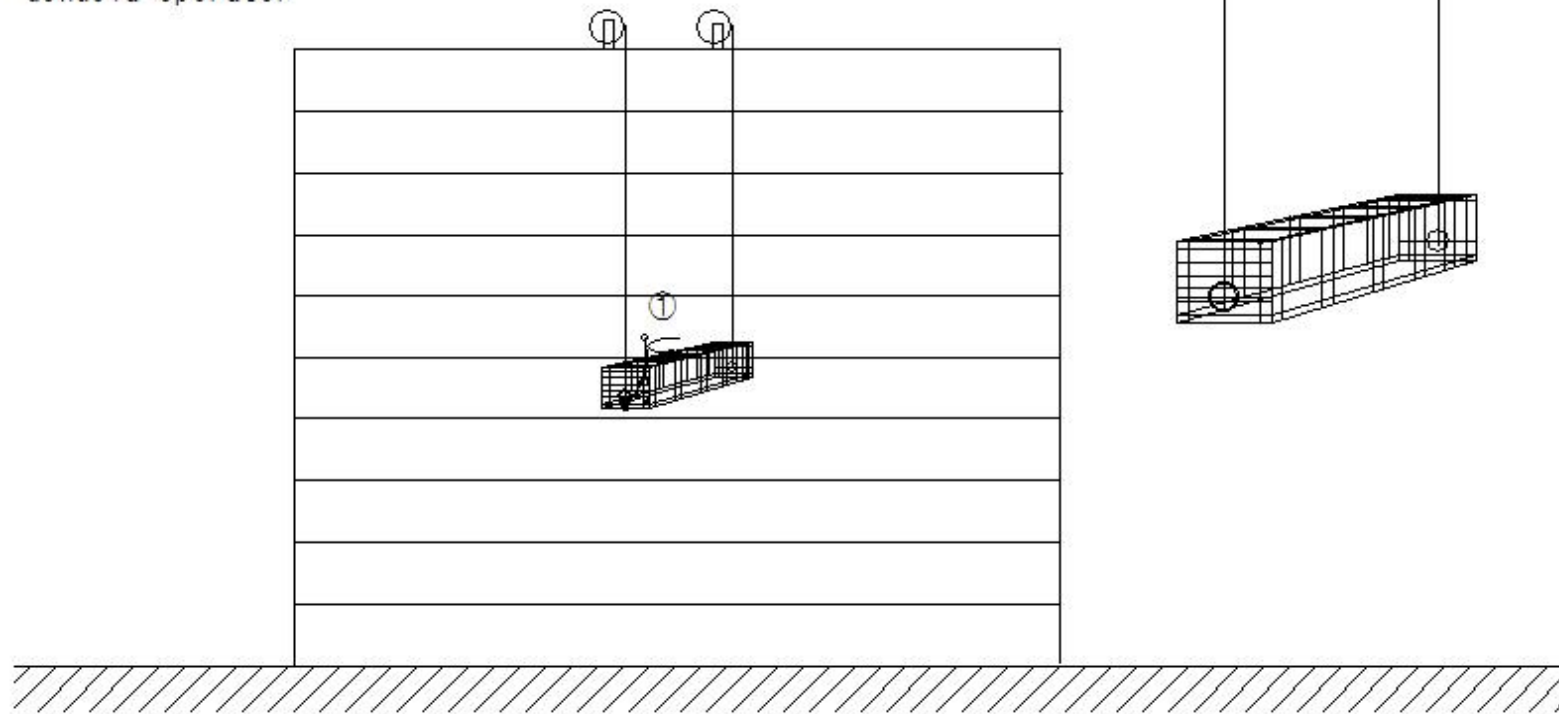
(S437) Gondola safety work

(S437) Gondola safety work

Gondola safety work

Employer → Gondola operator

- ① Placement of personnel who have completed special training
 - Gondola operator



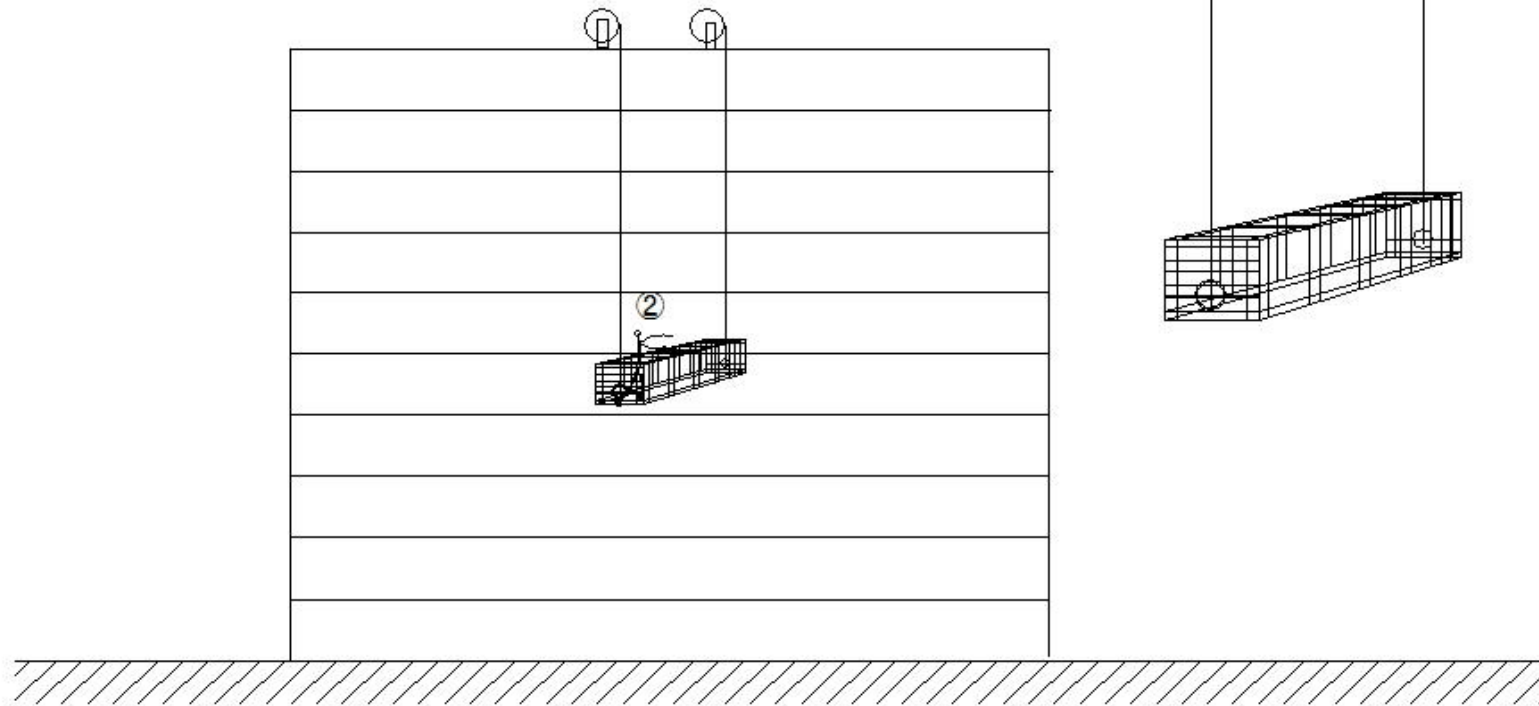
(S438) Gondola safety work

(S438) Gondola safety work

Gondola safety work

② Overload restrictions

- Prohibition on use of loads exceeding the load capacity

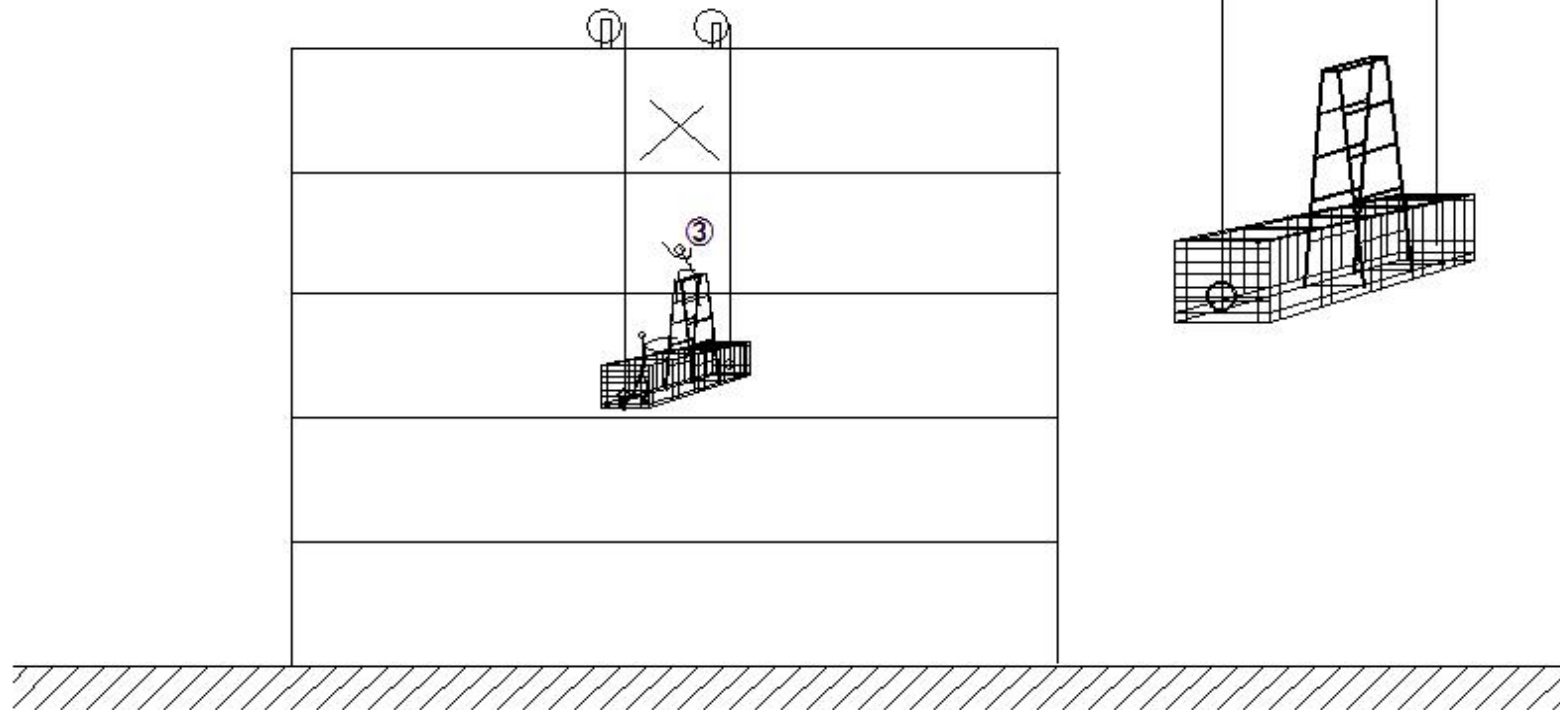


(S439) Gondola safety work

(S439) Gondola safety work

Gondola safety work

- ③ Prohibition on use of stepladders, etc.

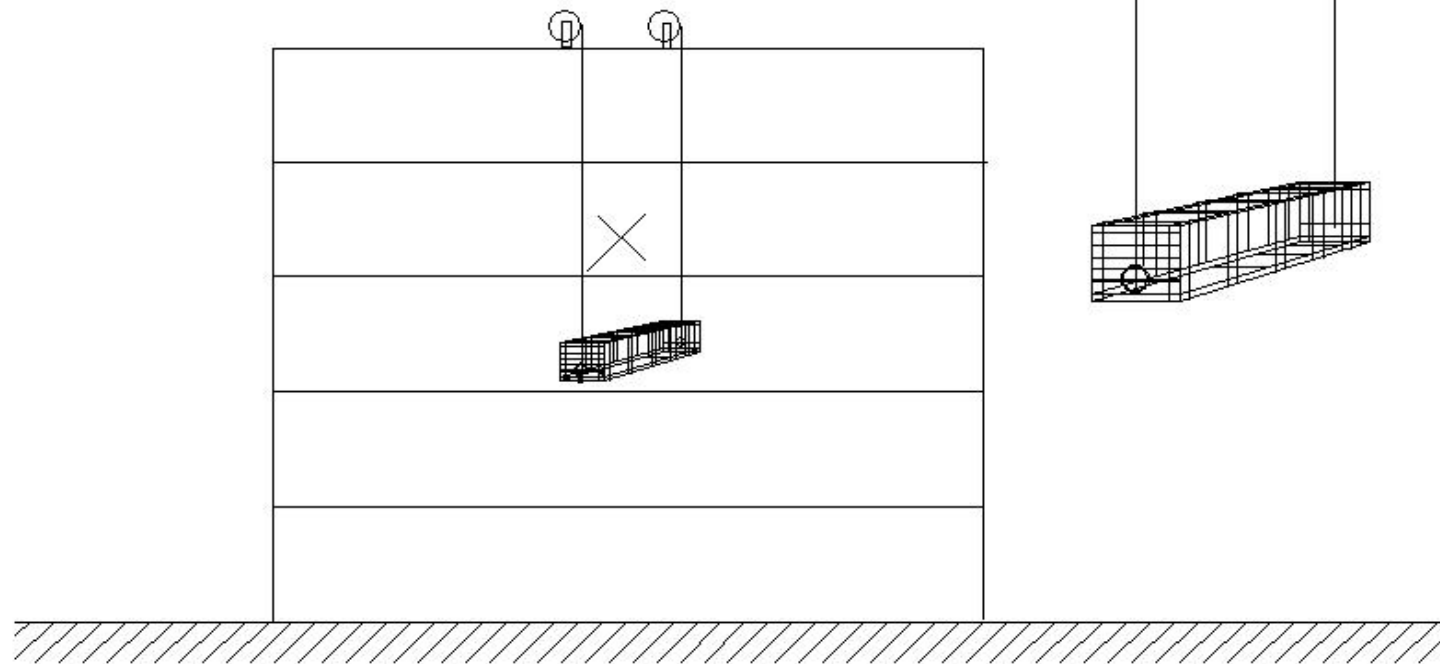


(S440) Gondola safety work

(S440) Gondola safety work

Gondola safety work

- ④ Prohibition on leaving the operating position
 - Do not leave the operating position in use



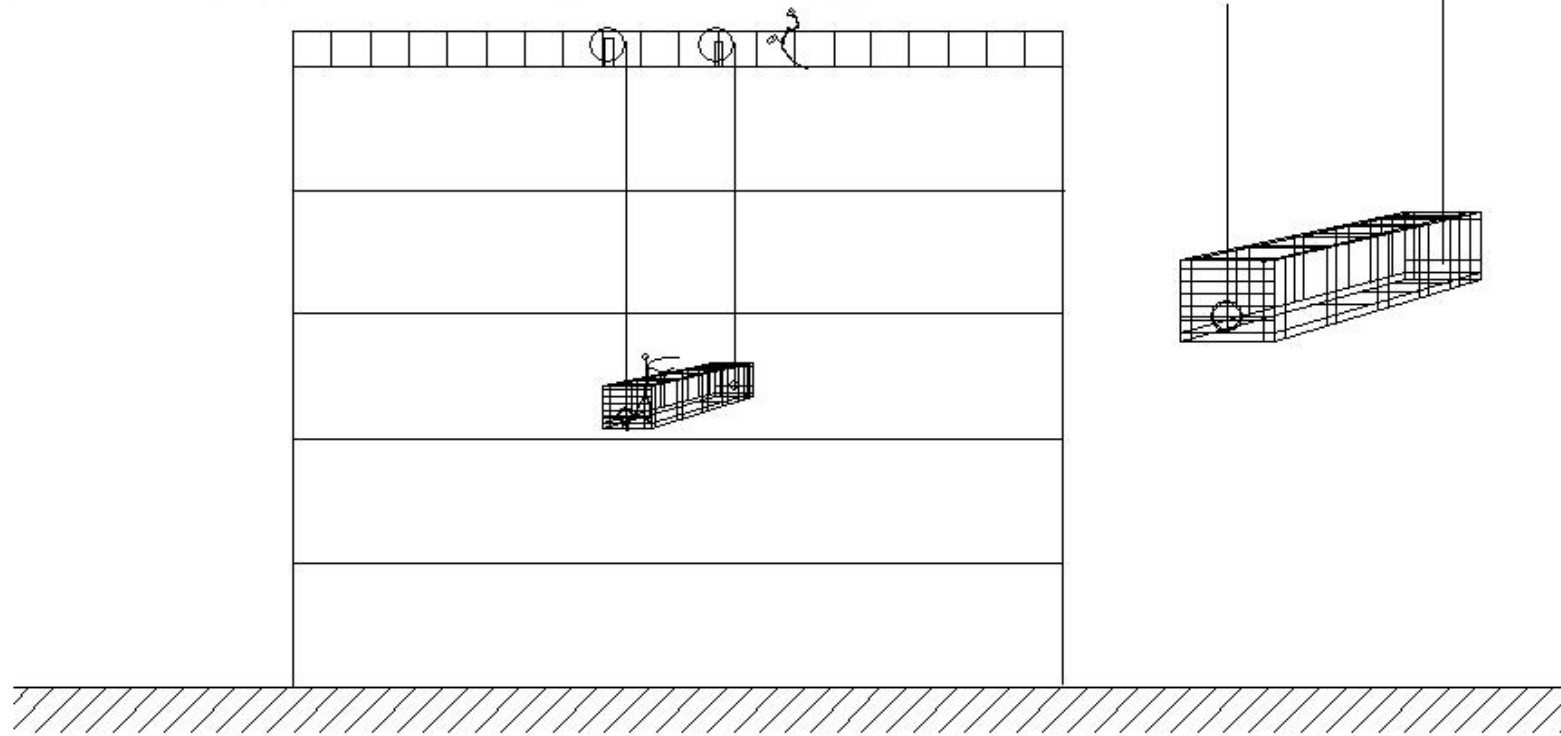
(S441) Gondola safety work

(S441) Gondola safety work

Gondola safety work

⑤ Operation signals

- Establish signals, designate a signal person and give the signal



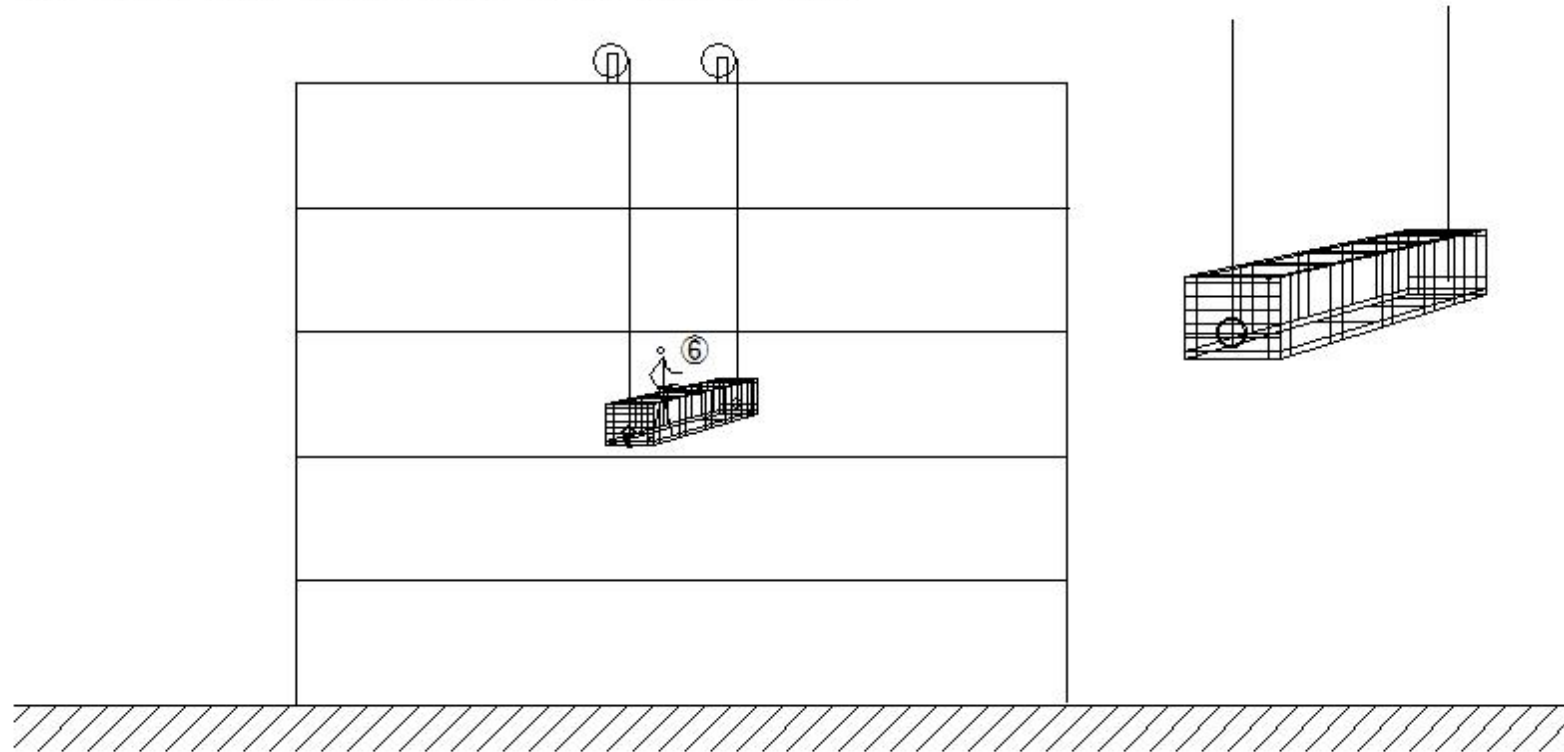
(S442) Gondola safety work

(S442) Gondola safety work

Gondola safety work

⑥ Use of safety belts

- Use safety belts when working on the gondola floor



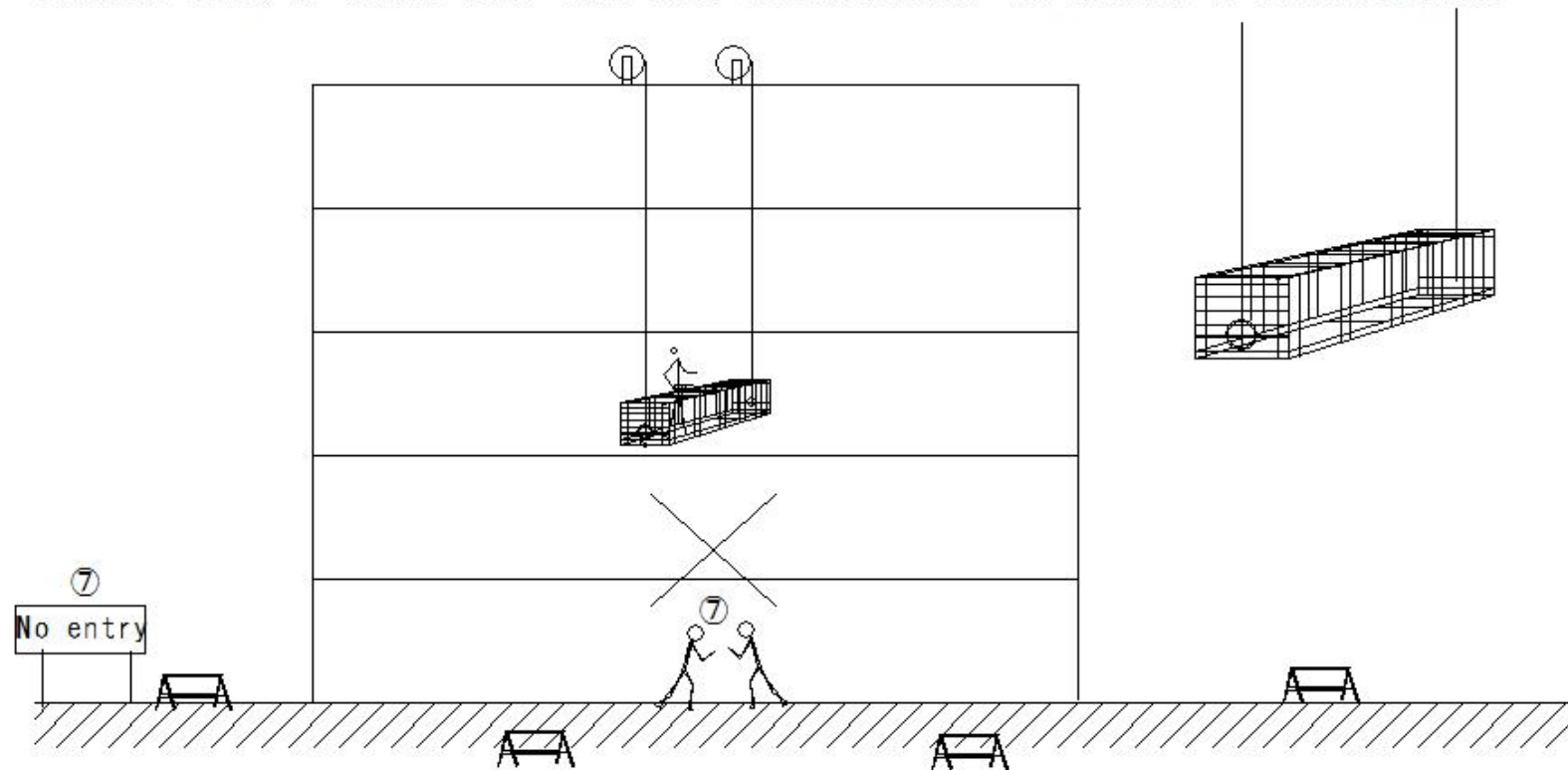
(S443) Gondola safety work

(S443) Gondola safety work

Gondola safety work

⑦ No entry measures

- Prohibit entry to anyone other than those involved below, and display in a visible place



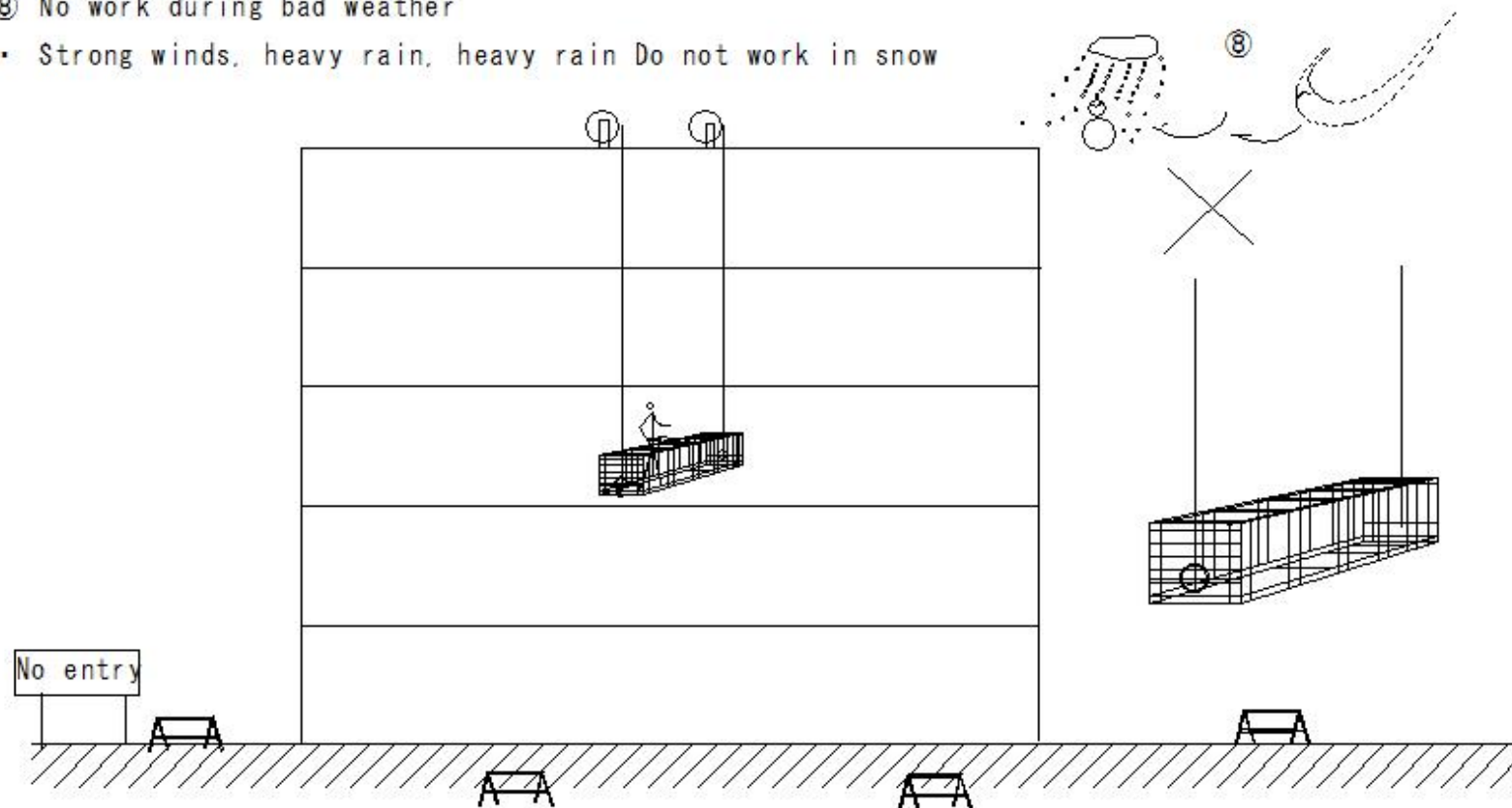
(S444) Gondola safety work

(S444) Gondola safety work

Gondola safety work

⑧ No work during bad weather

- Strong winds, heavy rain, heavy rain Do not work in snow



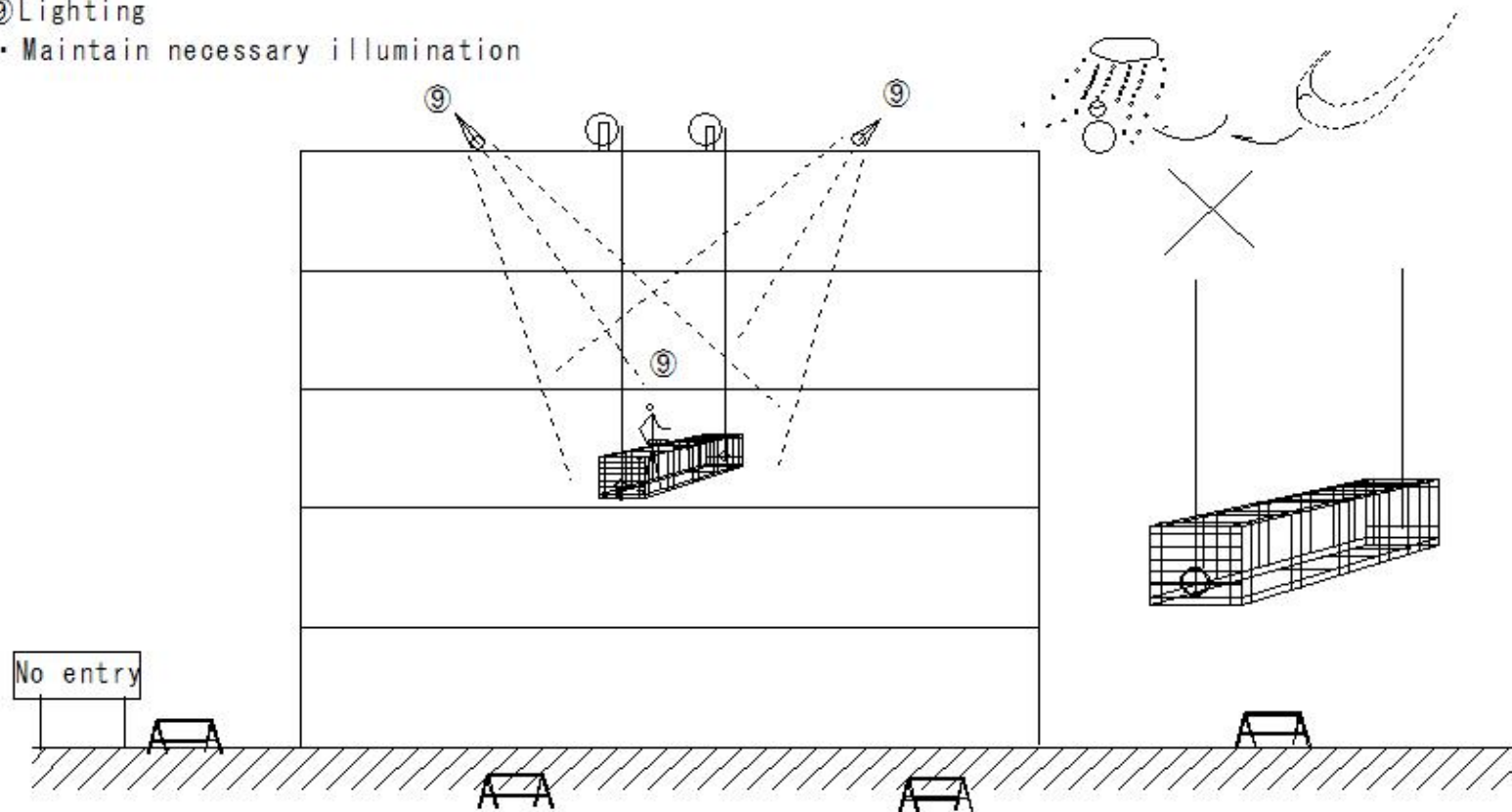
(S445) Gondola safety work

(S445) Gondola safety work

Gondola safety work

⑨ Lighting

- Maintain necessary illumination



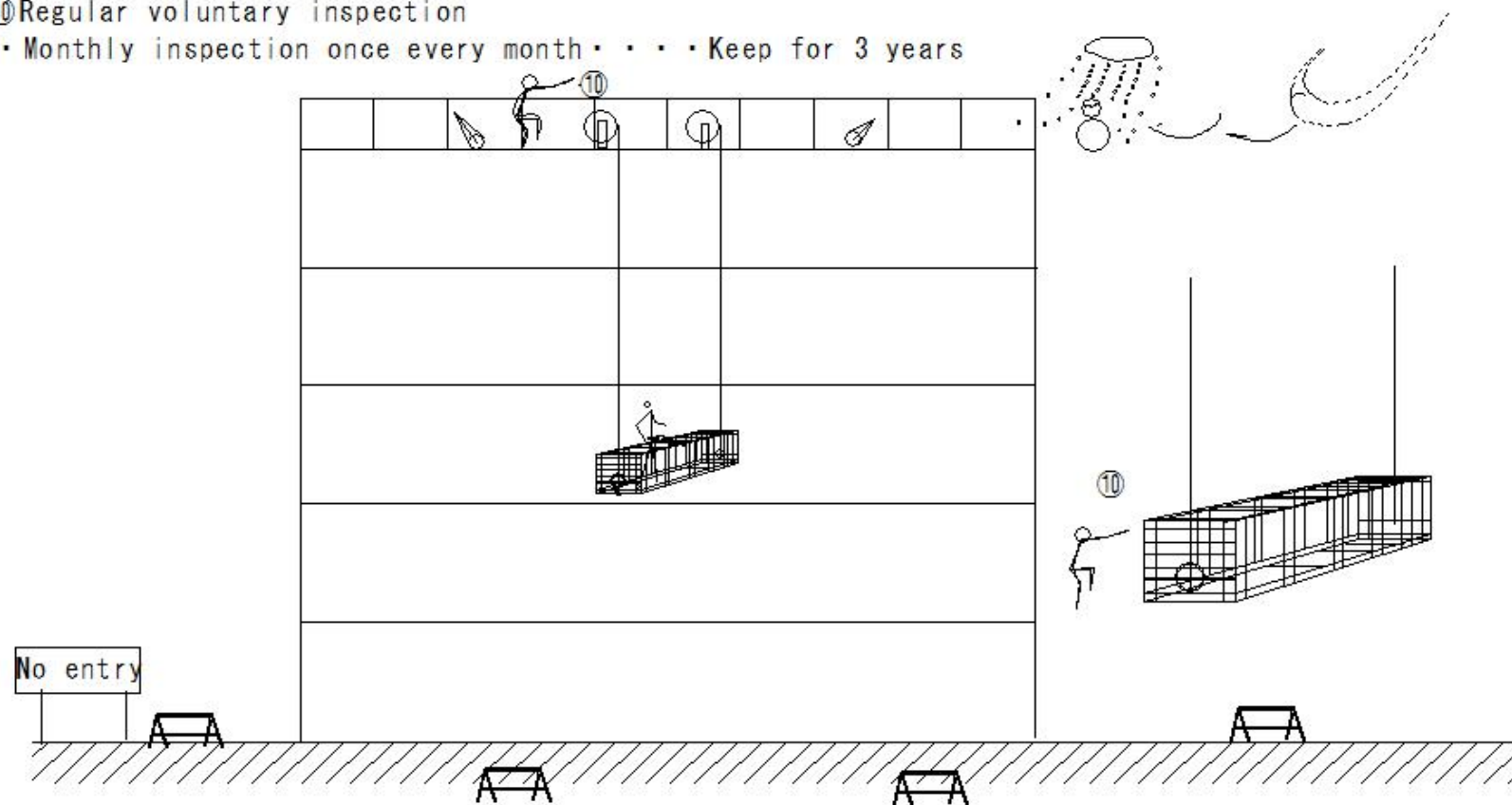
(S446)Gondola safety work

(S446)Gondola safety work

Gondola safety work

⑩Regular voluntary inspection

- Monthly inspection once every month • • • • Keep for 3 years



(S447) Gondola safety work

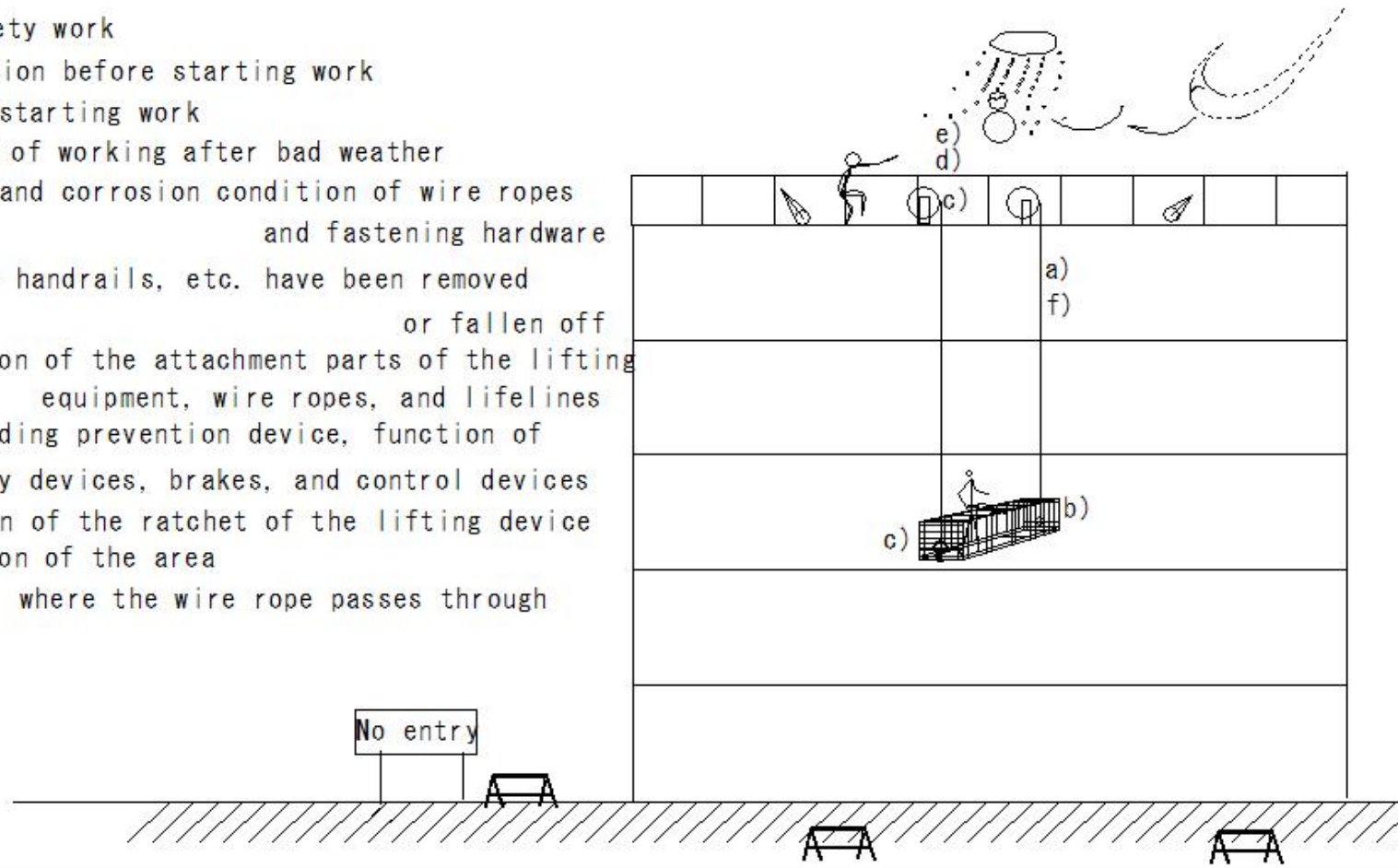
(S447) Gondola safety work

Gondola safety work

⑪ Inspection before starting work

- Before starting work
- In case of working after bad weather

- a) Damage and corrosion condition of wire ropes and fastening hardware
- b) Whether handrails, etc. have been removed or fallen off
- c) Condition of the attachment parts of the lifting equipment, wire ropes, and lifelines
- d) Overwinding prevention device, function of safety devices, brakes, and control devices
- e) Function of the ratchet of the lifting device
- f) Condition of the area where the wire rope passes through



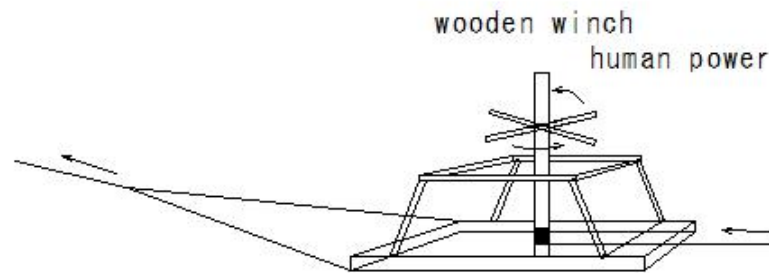
(S448)Safe winch operation

(S448)Safe winch operation

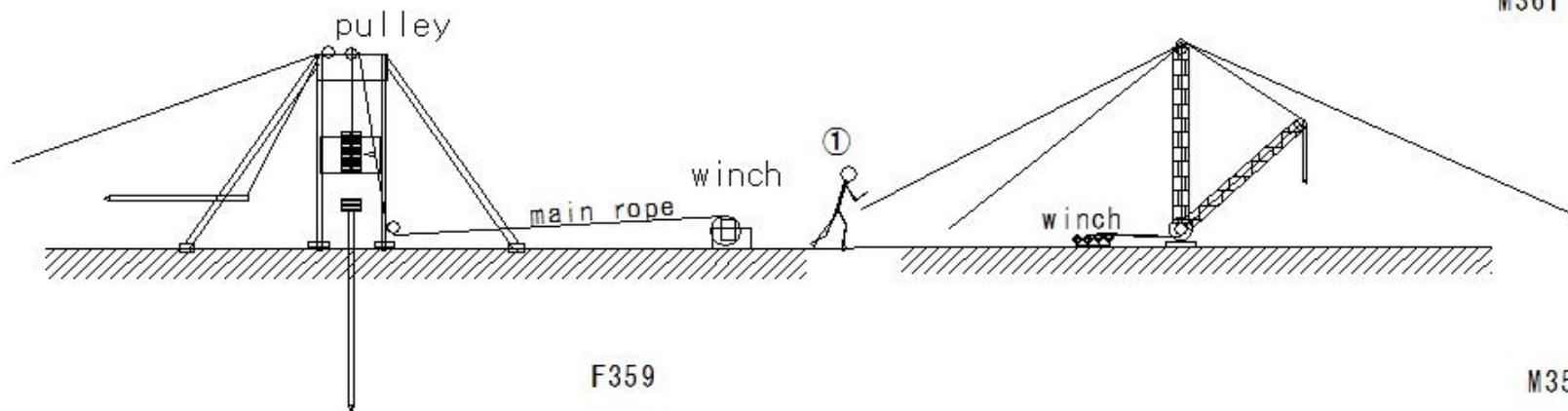
Safe winch operation

①Do not leave driving position

- Driver must not leave driving position while the winch is operating



M361

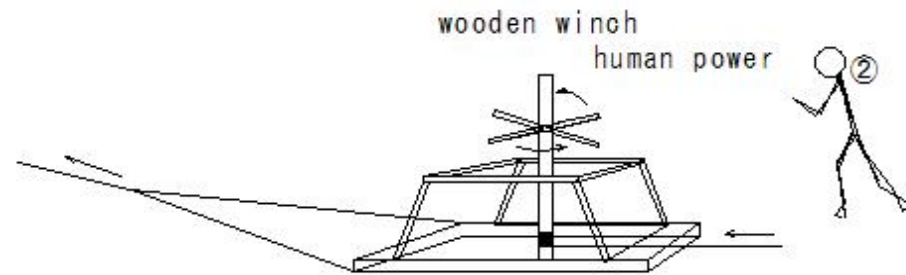


(S449) Safe winch operation

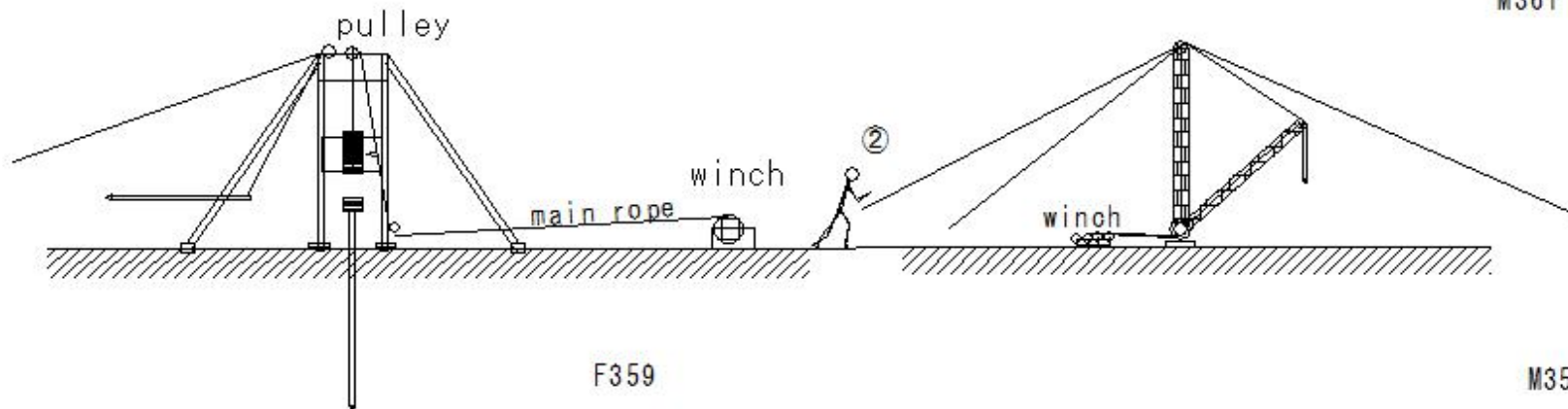
(S449) Safe winch operation

Safe winch operation

② Placement of persons who have completed special training



M361



F359

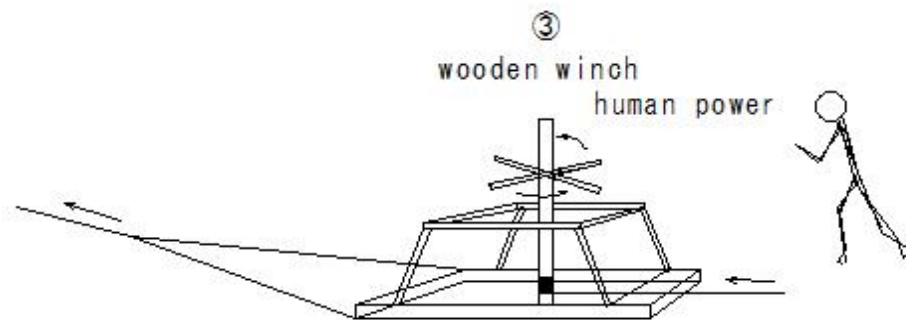
M359

(S450) Safe winch operation

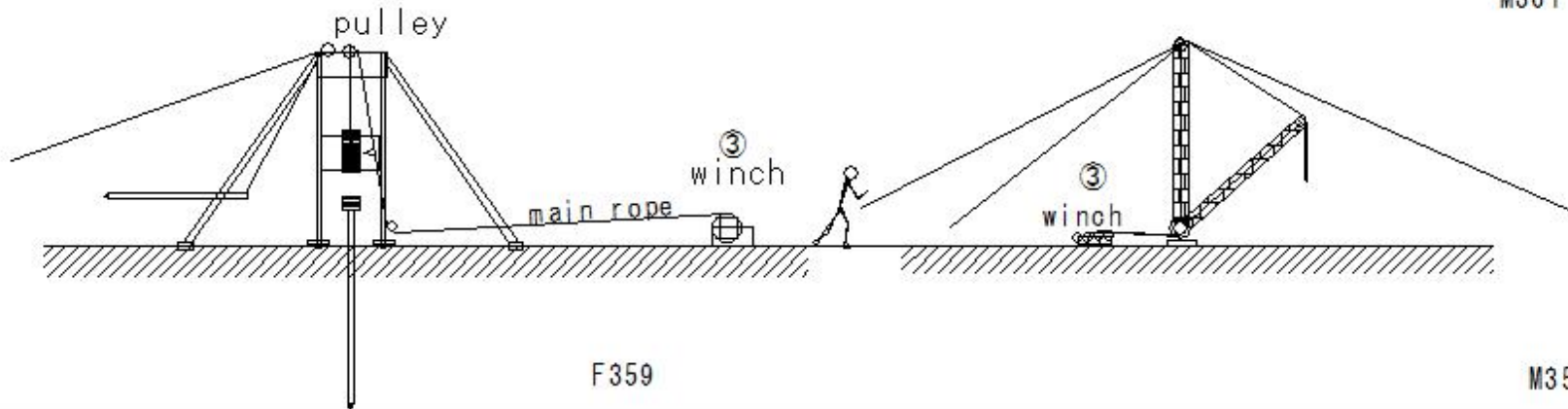
(S450) Safe winch operation

Safe winch operation

③ Operation of the winch



M361



(S451) Safe winch operation

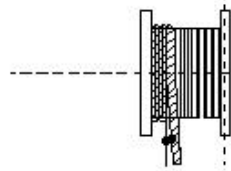
(S451) Safe winch operation

Safe winch operation

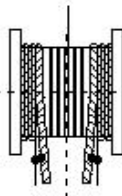
④ Fleet angle

In case of grooved drum

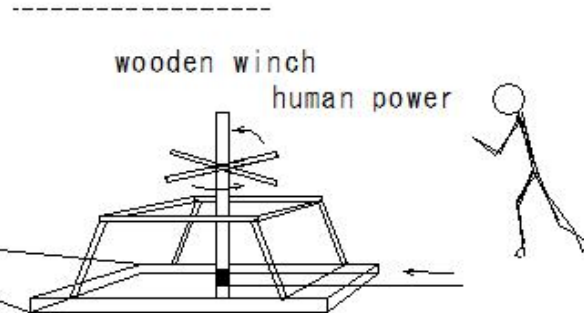
Direction of groove
 $\theta \leq 4^\circ$



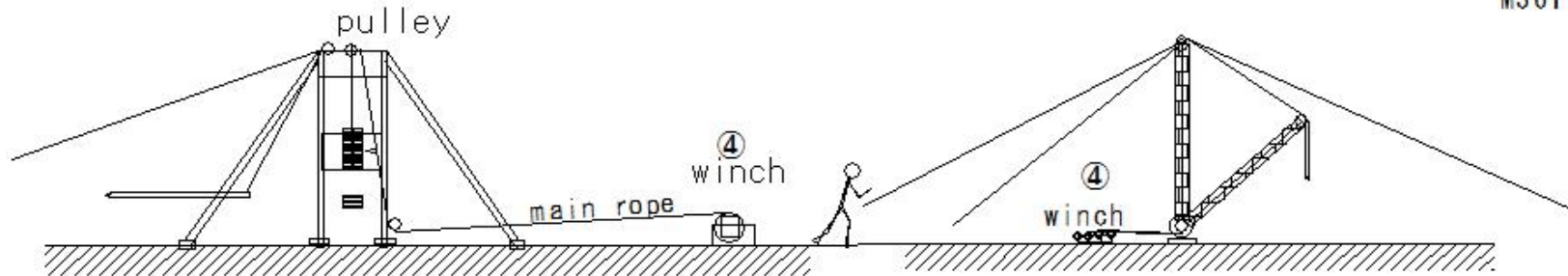
Flat drum
 $\theta \leq 2^\circ$



wooden winch
human power



M361



F359

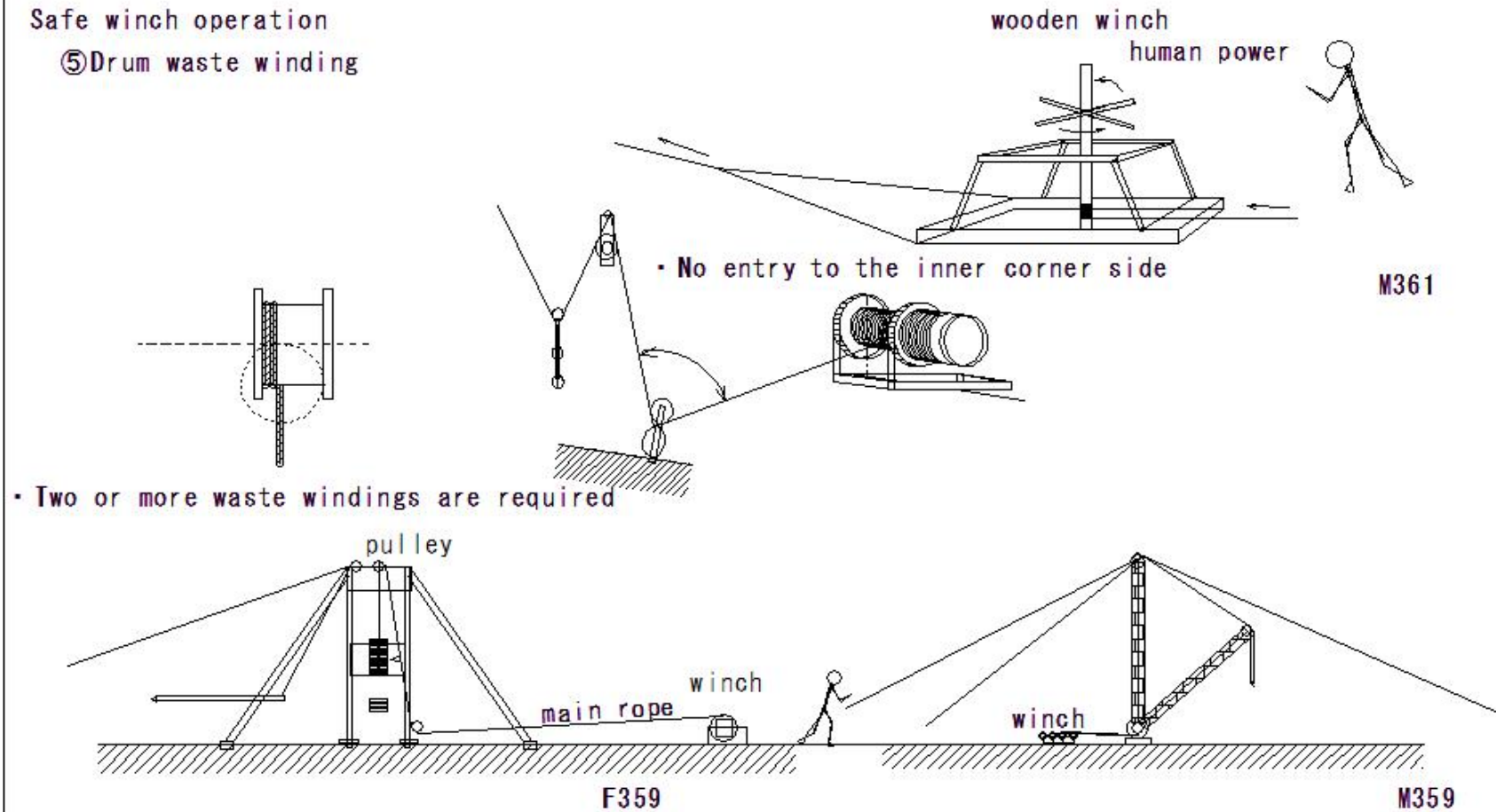
M359

(S452) Safe winch operation

(S452) Safe winch operation

Safe winch operation

⑤ Drum waste winding

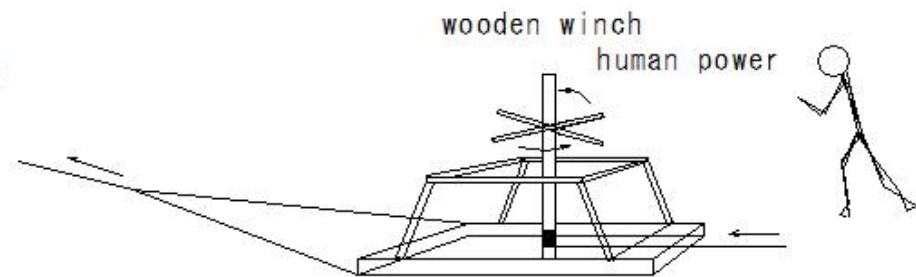


(S453) Safe winch operation

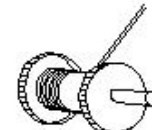
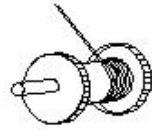
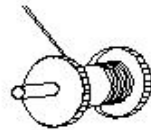
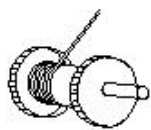
(S453) Safe winch operation

Safe winch operation

⑥ How to wind wire rope on flat drum



M361

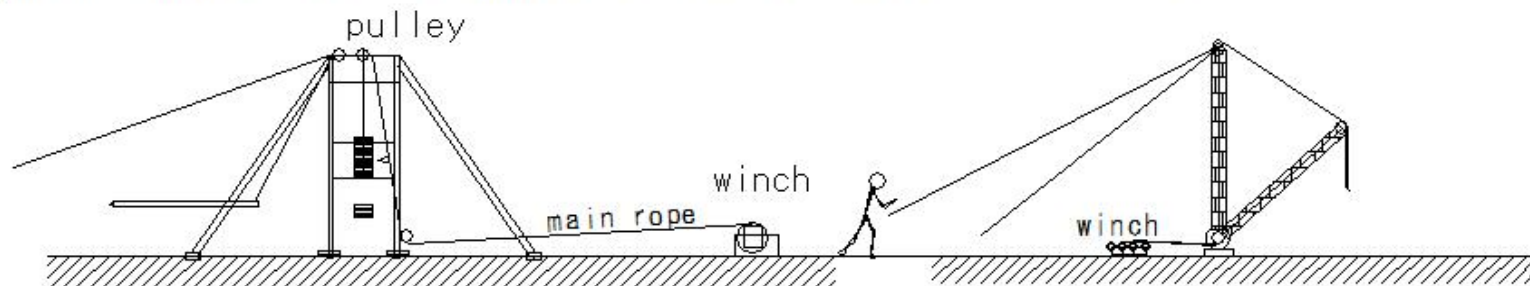


Upper net above Z

Lower net above Z

Upper net above S

Lower net above S



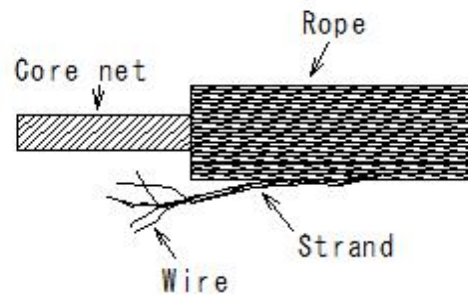
F359

M359

(S454)Overview of wire rope

(S454)Overview of wire rope

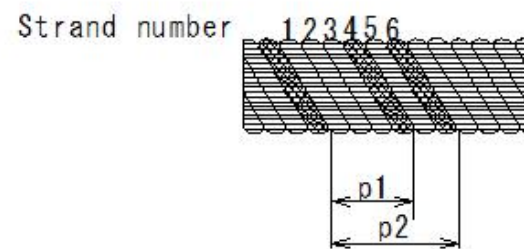
Overview of wire rope
○ Names of each part



(S455) Overview of wire rope

(S455) Overview of wire rope

Overview of wire rope
○ Names of each part



p1...For 4 strands

p2...For 6 strands

(S456) Overview of wire rope

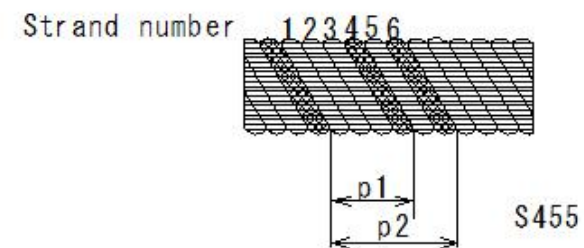
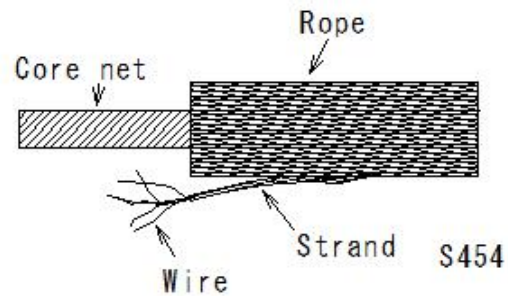
(S456) Overview of wire rope

Overview of wire rope

○ Do not use unsuitable wire rope

Do not use

- ① Wires with 10% or more of the prime number of wires broken between 1 twist
- ② Diameter reduction exceeds 7% of nominal diameter
- ③ Kinked
- ④ Severe deformation or corrosion



(S457) Overview of wire rope

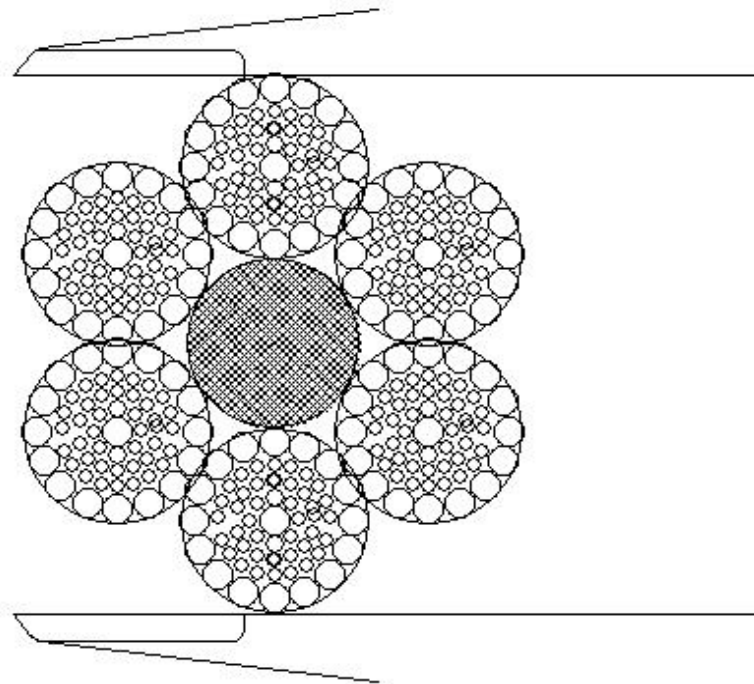
(S457) Overview of wire rope

Overview of wire rope

○ Rope diameter

Nominal diameter: Indicated in standards, catalogs, etc.

Actual diameter: Diameter at the time of manufacture



(S458)Overview of wire rope

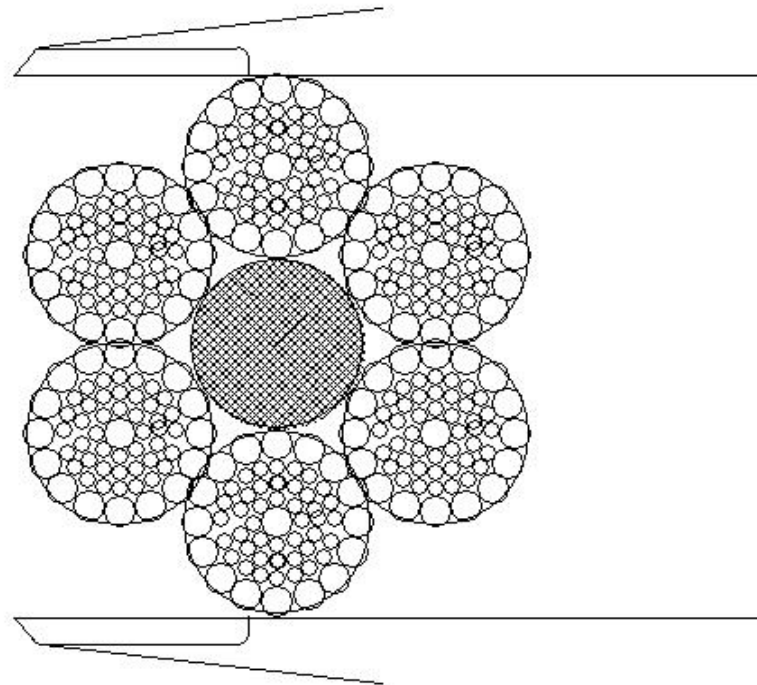
(S458)Overview of wire rope

Overview of wire rope

○ Rope tolerance

Ropes over 10mm: Actual diameter = Nominal diameter x (1.00-1.07)

Ropes under 10mm: Actual diameter = Nominal diameter x (1.00-1.10)



(S459)Overview of wire rope

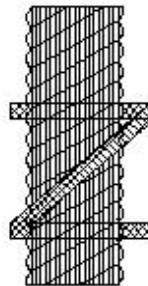
(S459)Overview of wire rope

Overview of wire rope

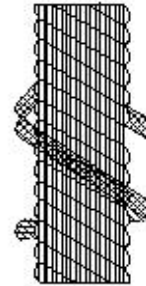
○ Rope tolerance

Twist direction

Z twist is common



Normal Z twist



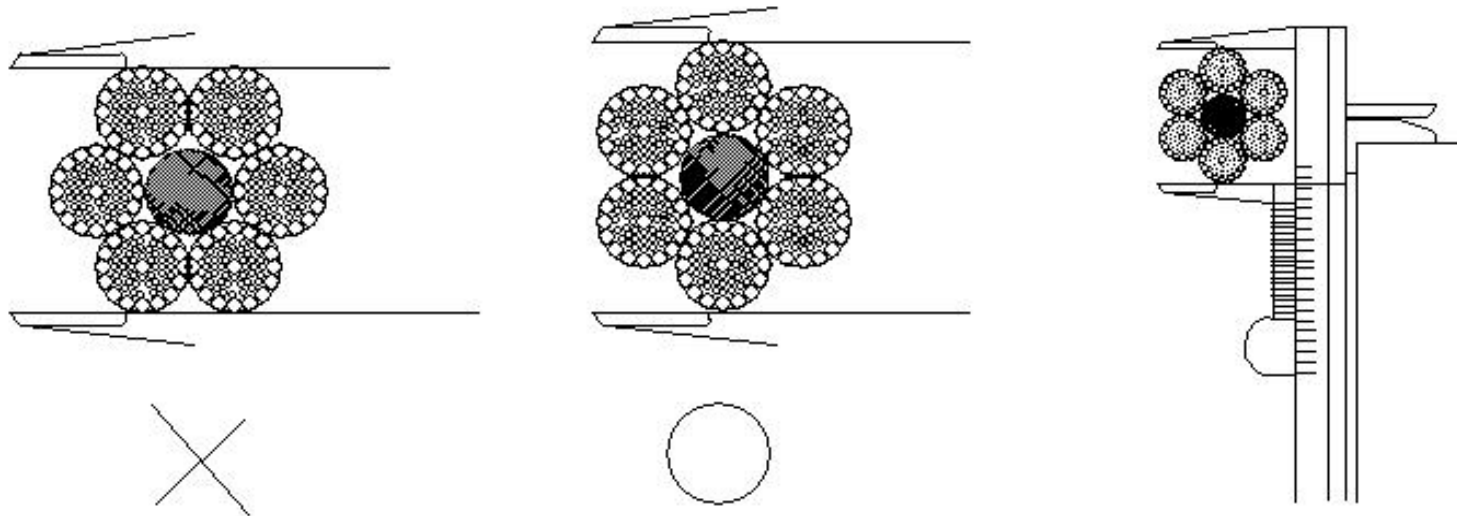
Normal S twist

(S460)Overview of wire rope

(S460)Overview of wire rope

Overview of wire rope

How to measure the diameter of a wire rope

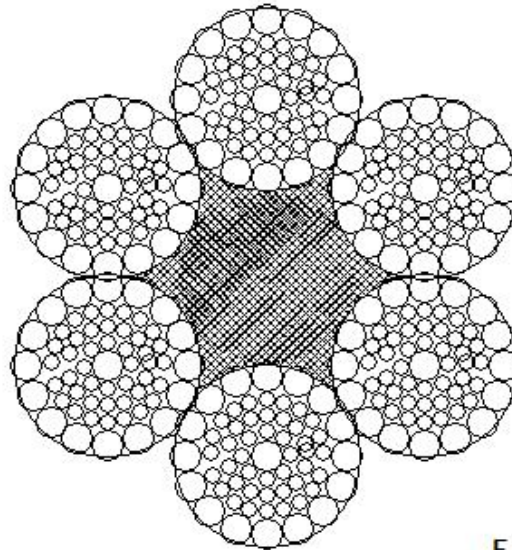


(S461)Overview of wire rope

(S461)Overview of wire rope

Overview of wire rope

Wire rope used for cranes



Filler type

JIS G 3525-1998

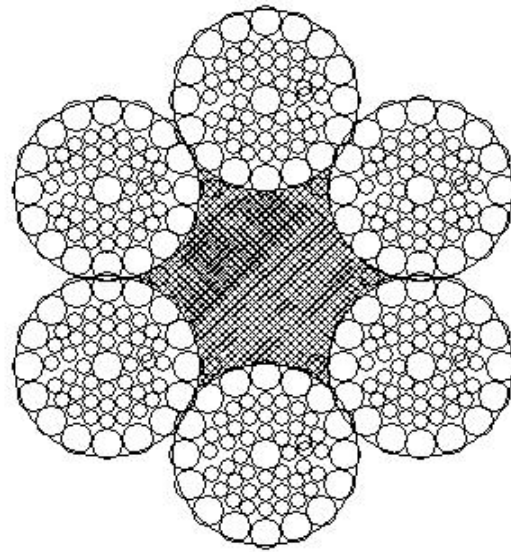
6xFi (29)

(S462)Overview of wire rope

(S462)Overview of wire rope

Overview of wire rope

Wire rope used for cranes



Warrington seal type

JIS G 3525-1998

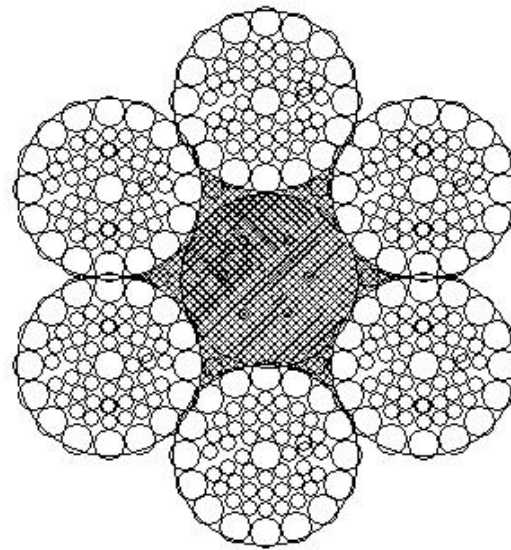
WRC6xWS(31)

(S463)Overview of wire rope

(S463)Overview of wire rope

Overview of wire rope

Wire rope used for cranes



Warrington seal type

JIS G 3525-1998

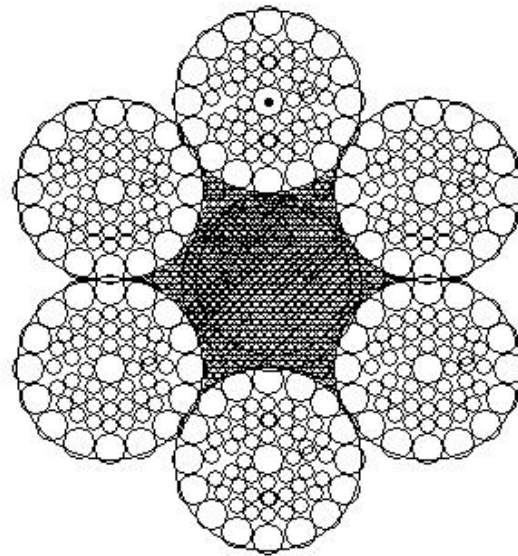
WRC6xWS (36)

(S464)Overview of wire rope

(S464)Overview of wire rope

Overview of wire rope

○Wire rope used for slinging



Strand core mesh included

JIS G 3525-1998

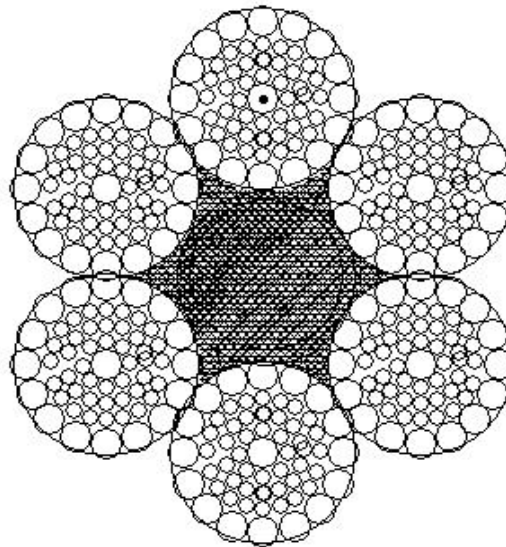
6x24

(S465)Overview of wire rope

(S465)Overview of wire rope

Overview of wire rope

○Wire rope used for slinging



Strand core mesh not included

JIS G 3525-1998

6x37

(S466)How to fix wire rope

(S466)How to fix wire rope

How to fix wire rope

○How to fix with clips

○Correct method



× Incorrect method



× Incorrect method



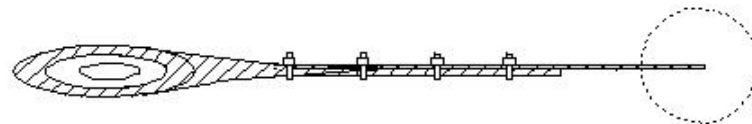
(S467)How to fix wire rope

(S467)How to fix wire rope

How to fix wire rope

○How to fix with clips

○In the case of wedge fastening



× Incorrect method

○ Correct method



(S468)How to fix wire rope

(S468)How to fix wire rope

How to fix wire rope

○Standards for using clips

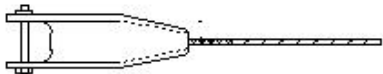
Rope diameter (mm)	Number of clips	Clip interval
9~16	4	80
18	5	110
22.4	5	130
25	5	150
28	5	180
31.5	6	200
35.5	7	230
37.5	8	250

(S469)How to fix wire rope

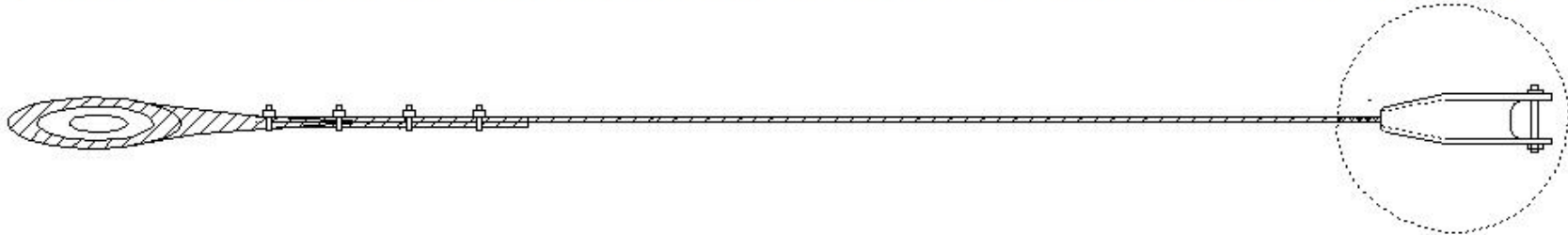
(S469)How to fix wire rope

How to fix wire rope

○How to fasten the terminal and its efficiency

How to process the terminal		Efficiency (%)	Notes
① Socket fastening		100	Alloy or zinc casting

Efficiency: Strength of the terminal processing part against the cutting load of the wire rope




(S470)How to fix wire rope

(S470)How to fix wire rope

How to fix wire rope

How to fasten the terminal and its efficiency

How to process the terminal	Efficiency (%)	Notes
<div>②Clip fastening</div> 	80-85	Less than 50% of the ropes are not secured properly (requires re-tightening)

Efficiency: Strength of the terminal processing part against the cutting load of the wire rope




(S471)How to fix wire rope

(S471)How to fix wire rope

How to fix wire rope

○How to fasten the terminal and its efficiency

How to process the terminal		Efficiency (%)	Notes
③Wedge fastening		60-70	Less than 50% of the ropes are not secured properly

Efficiency: Strength of the terminal processing part against the cutting load of the wire rope

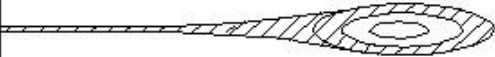


(S472)How to fix wire rope

(S472)How to fix wire rope

How to fix wire rope

○How to fasten the terminal and its efficiency

How to process the terminal		Efficiency (%)	Notes
④Eye splice		75-95	Ropes with diameters less than 15mm: 95% 16mm to 26mm: 85% 28mm to 38mm: 80% 39mm or more: 75%

Efficiency: Strength of the terminal processing part against the cutting load of the wire rope

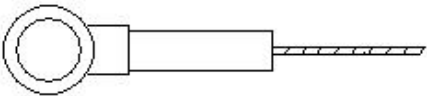


(S473)How to fix wire rope

(S473)How to fix wire rope

How to fix wire rope

○How to fasten the terminal and its efficiency

How to process the terminal		Efficiency (%)	Notes
⑤ Single lock		100	Limited to core or rope core

Efficiency: Strength of the terminal processing part against the cutting load of the wire rope

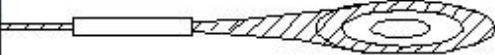


(S474)How to fix wire rope

(S474)How to fix wire rope

How to fix wire rope

○How to fasten the terminal and its efficiency

How to process the terminal		Efficiency (%)	Notes
⑥ Compression fastening		95	Aluminum tubes are pressed

Efficiency: Strength of the terminal processing part against the cutting load of the wire rope



(S475)Wire rope for lifting

(S475)Wire rope for lifting

○ Ring equipment, etc. : Shape of both ends of wire rope



① Eye wire rope on both ends: Eye splice

(S476)Wire rope for lifting

(S476)Wire rope for lifting

○ Ring equipment, etc.: Shape of both ends of wire rope



② Wire rope with shackle

(S477)Wire rope for lifting

(S477)Wire rope for lifting

○ Ring equipment, etc.: Shape of both ends of wire rope



③ Eye wire rope on both ends: Compression stop

(S478)Wire rope for lifting

(S478)Wire rope for lifting

○ Ring equipment, etc.: Shape of both ends of wire rope



④ Wire rope with hook

(S479)Wire rope for lifting

(S479)Wire rope for lifting

○ Ring equipment, etc.: Shape of both ends of wire rope



⑤ Wire rope with ring

(S480)Wire rope for lifting

(S480)Wire rope for lifting

○ Ring equipment, etc. ○ Shape of both ends of wire rope

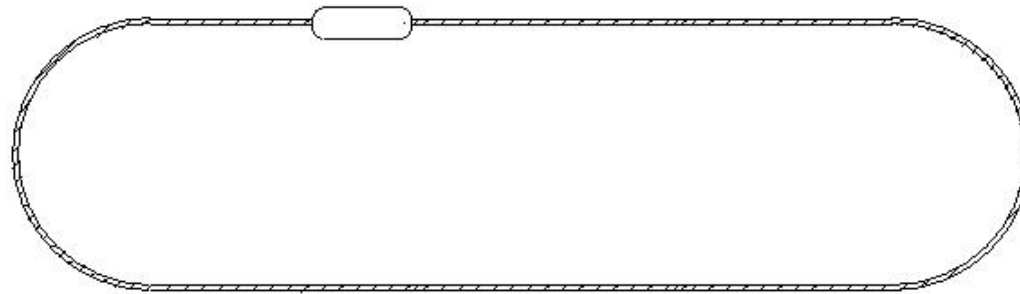


⑥ Chain with ring

(S481)Wire rope for lifting

(S481)Wire rope for lifting

○ Ring equipment, etc. : Shape of both ends of wire rope



⑦ Endless wire rope

(S482)Wire rope for lifting

(S482)Wire rope for lifting

○ Ring equipment, etc.: Shape of both ends of wire rope



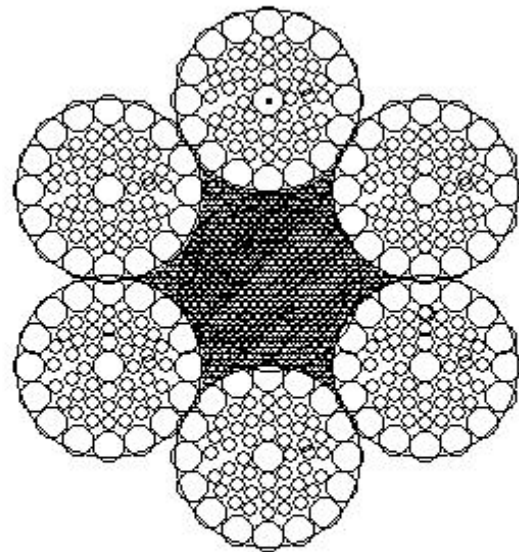
⑧ Chain with hook

(S483)Wire rope for lifting

(S483)Wire rope for lifting

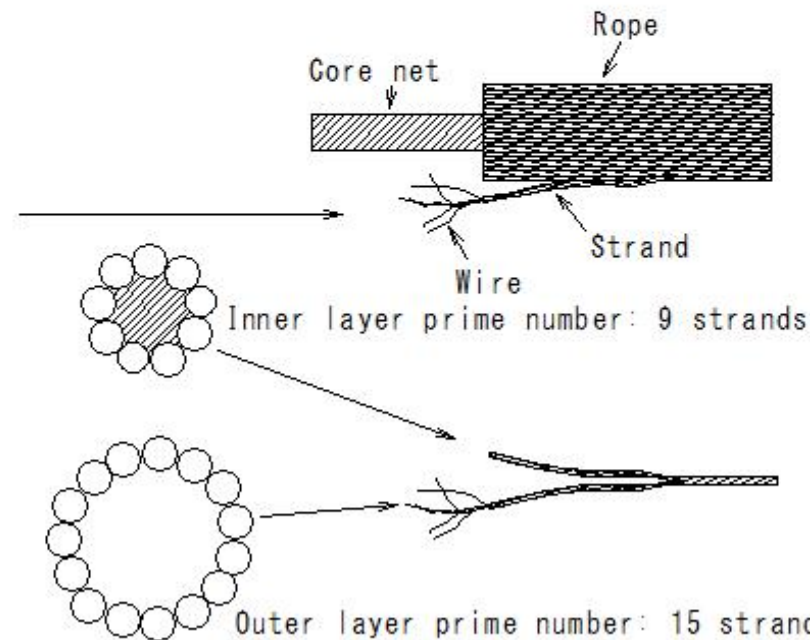
○ Ring equipment, etc. : Shape of both ends of wire rope

Wire rope for lifting and wire rope with base: In case of ice prime



Strand: 24 strands

6x24 JIS G 3525 example



How to separate half-inserted strands

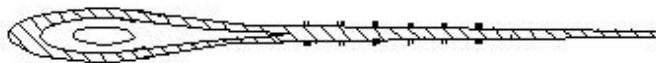
(S484)Wire rope for lifting

(S484)Wire rope for lifting

Wire rope for lifting and wire rope with base: In case of ice prime

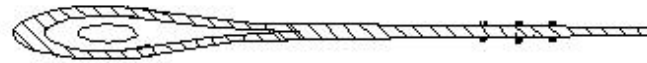
○ Safety factor

Wire rope for lifting... 6 or more



Wire rope for lifting
3 round inserts
2 half inserts (12 strands)

Wire rope with base... 4 or more

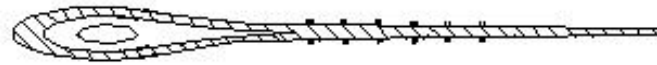


Wire rope with base
5 round inserts (6 strands)

(S485)Wire rope for lifting

(S485)Wire rope for lifting

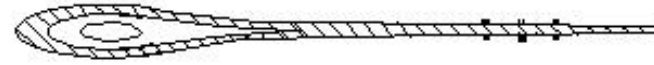
Wire rope for lifting and wire rope with base: In case of ice prime



Wire rope for lifting

3 round inserts

2 half inserts (12 strands)



Wire rope with base

5 round inserts (8 strands)

(S486)Management of slinging equipment

(S486)Management of slinging equipment

Management of slinging equipment

○ Safety factor of wire rope, etc.



Gross section of wire



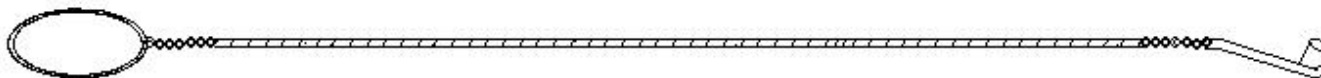
Wire rope... 6 or more

S475



Suspension chain... 5 or 4 or more

S480



Hook/shackle... 5 or more

S482

(S487)Management of slinging equipment

(S487)Management of slinging equipment

Management of slinging equipment

○ Prohibition of use of unsuitable wire rope

① Wires with 10% or more of the prime number of wires broken between 1 strand

② Diameter reduction exceeds 7% of nominal diameter

③ Kinked

④ Significant deformation or corrosion



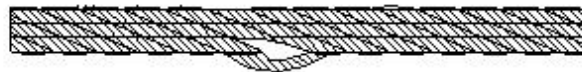
Cross section of wire



Kinked



Crushing



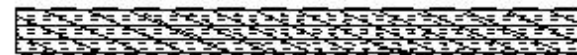
Strand protrusion



Strand loosening (cage-like)



Core mesh protrusion



Wear

(S488)Management of slinging equipment

(S488)Management of slinging equipment

Management of slinging equipment

○ Prohibition of use of unsuitable chain

① Elongation is 5% of the time of manufacture exceeding

② The reduction in the cross-sectional diameter of the link exceeds 10% of the manufacturing value

③ The item has a crack



Chain with ring

(S489)Management of slinging equipment

(S489)Management of slinging equipment

Management of slinging equipment

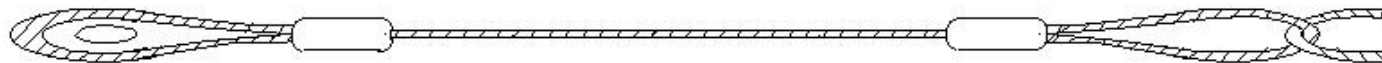
○Do not use unsuitable hooks, shackles, etc.

- Items with deformation or cracks



Wire rope with hook

S478



Wire rope with jackle

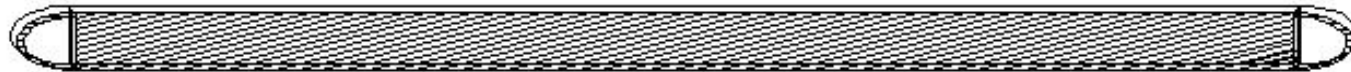
S476

(S490)Management of slinging equipment

(S490)Management of slinging equipment

Management of slinging equipment

- Do not use unsuitable fiber ropes, etc.
- ①Items with broken strands
Strands protruding
- ②Items with significant damage or corrosion



fiber ropes

(S491)Management of slinging equipment

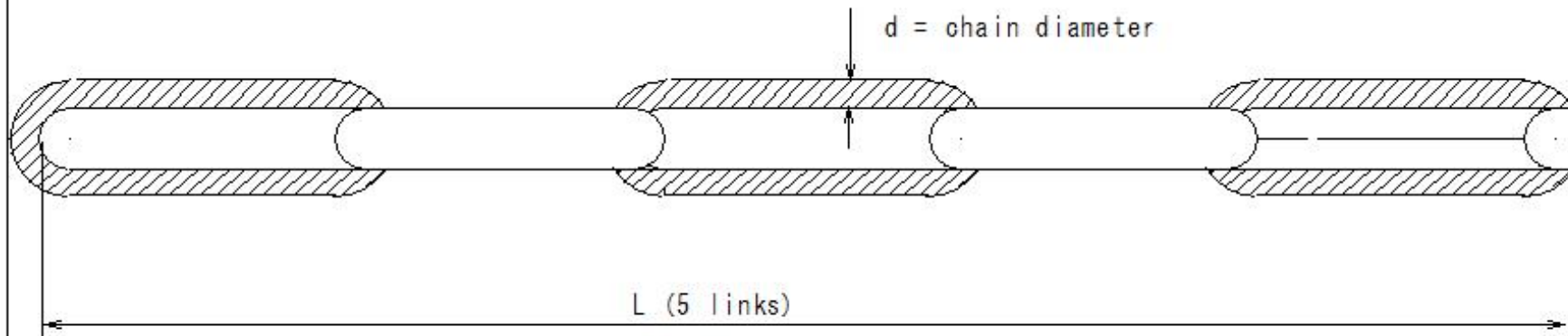
(S491)Management of slinging equipment

Management of slinging equipment

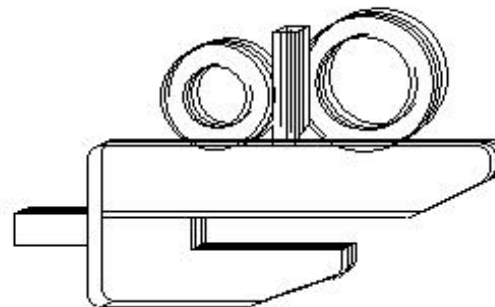
○ Limitation of range of use

- ① Use chain blocks, lifting clamps, etc. within the range of the load to be used, etc.

Chain block



Lifting clamp



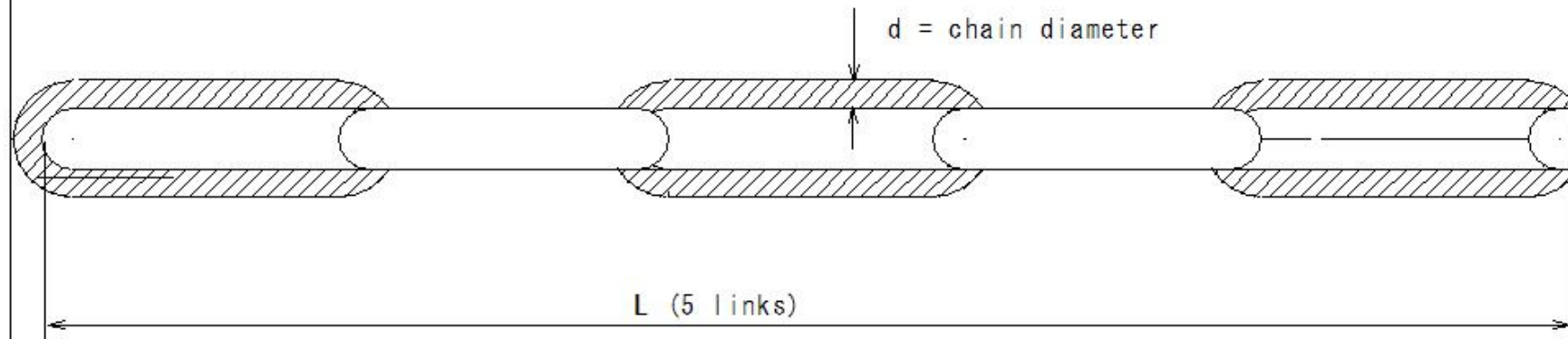
(S492)Management of slinging equipment

(S492)Management of slinging equipment

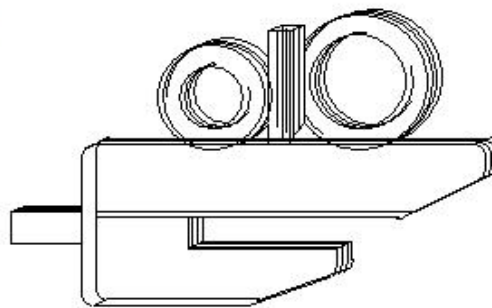
Management of slinging equipment

○ Inspection before starting work

Chain block



Lifting clamp



(S493)Safety load of sling wire rope

(S493)Safety load of sling wire rope

Safety load of sling wire rope

○Safety load for wire rope diameter and lifting angle

Safety load table

Wire rope diameter (mm)	Breaking load (KN)	Basic safe load (t)	6×24 Type A (bare)				Suitable shackle		
			2-strand lifting			4-strand lifting	Nominal diameter (mm)	Usable load (t)	JIS B2801 grade)
			Vertical (t)	30° (t)	60° (t)	30° (t)			
9	39.9	0.67	1.3	1.3	1.1	2.6	12	1.00	SC
12	71.0	1.20	2.4	2.3	2.0	4.6	16	1.60	"
16	126.0	2.10	4.2	4.1	3.7	8.2	20	2.50	"
18	160.0	2.70	5.4	5.2	4.7	10.0	22	3.15	"
20	197.0	3.30	6.7	6.4	5.8	12.5	26	4.00	"
25	308.0	5.20	10.0	10.0	9.0	20.0	32	6.30	"
30	444.0	7.50	15.0	14.0	13.0	29.0	36	8.00	"
40	789.0	13.00	26.0	25.0	23.0	51.5	48	14.00	SB
50	1230.0	20.00	41.0	40.0	36.0	80.0	65	25.00	"

(S494)Safety load of sling wire rope

(S494)Safety load of sling wire rope

Safe load of wire rope for slinging (1)

○Increase coefficient of wire tension due to hanging angle

Hanging angle (θ)	Increase coefficient of rope tension	Hanging angle (θ)	Increase coefficient of rope tension	Hanging angle (θ)	Increase coefficient of rope tension
0	1.000	60	1.16	120	2.00
10	1.005	70	1.22	130	2.37
20	1.020	80	1.31	140	2.93
30	1.040	90	1.41	150	3.86
40	1.070	100	1.56		
50	1.100	110	1.74		

(S495) Safety load of sling wire rope

(S494) Safety load of sling wire rope

Safe load of wire rope for slinging (1)

○ Increase coefficient of wire tension due to hanging angle

Hanging angle (θ)	Increase coefficient of rope tension	Hanging angle (θ)	Increase coefficient of rope tension	Hanging angle (θ)	Increase coefficient of rope tension
0	1.000	60	1.16	120	2.00
10	1.005	70	1.22	130	2.37
20	1.020	80	1.31	140	2.93
30	1.040	90	1.41	150	3.86
40	1.070	100	1.56		
50	1.100	110	1.74		



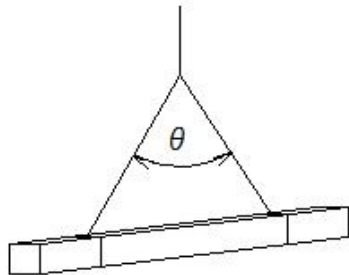
- Tension increase factor = $1/\cos\theta/2$
- Safe load = (breaking load x number of slings)/(safety factor x tension increase factor x 9.8)
- Basic safe load = breaking load/(safety factor x 9.8)(t)
- Breaking load = (wire rope diameter)²/2(KN)

(S496) Safety load of sling wire rope

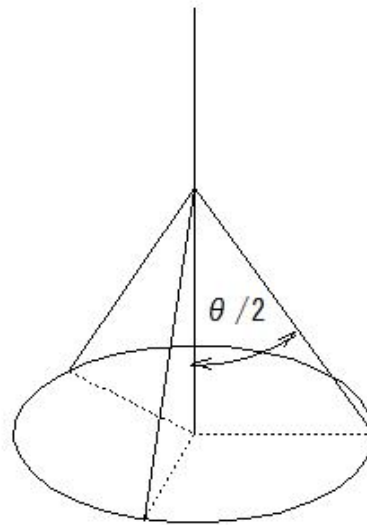
(S496) Safety load of sling wire rope

Safe load of wire rope for slinging

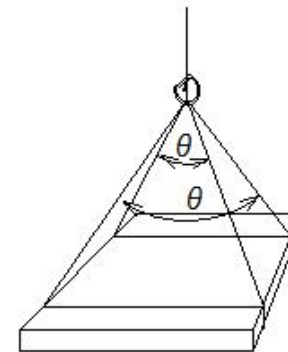
○ Suspension angle



2-strand suspension



3-strand suspension



4-strand suspension

(S497)Guidelines for safety in slinging work

(S497)Guidelines for safety in slinging work

Guidelines for safety in slinging work

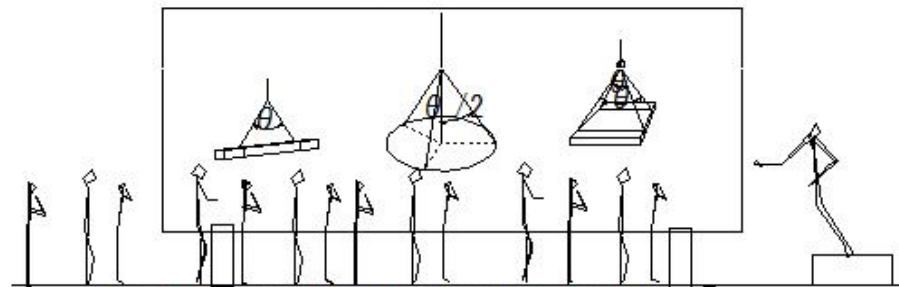
Prevention of industrial accidents

○ Measures to be taken by employers

- ① Preparation of work procedures and work plans and thorough dissemination of them
- ② Decision on work layout and appointment of slinging work manager
- ③ Conducting pre-work meetings and giving thorough instructions
- ④ Selection of slinging method
- ⑤ Carrying out daily maintenance inspections

Person responsible for slinging work

Pre-work meeting



Employers appoint slinging workers
and gather related workers
to hold a pre-work meeting

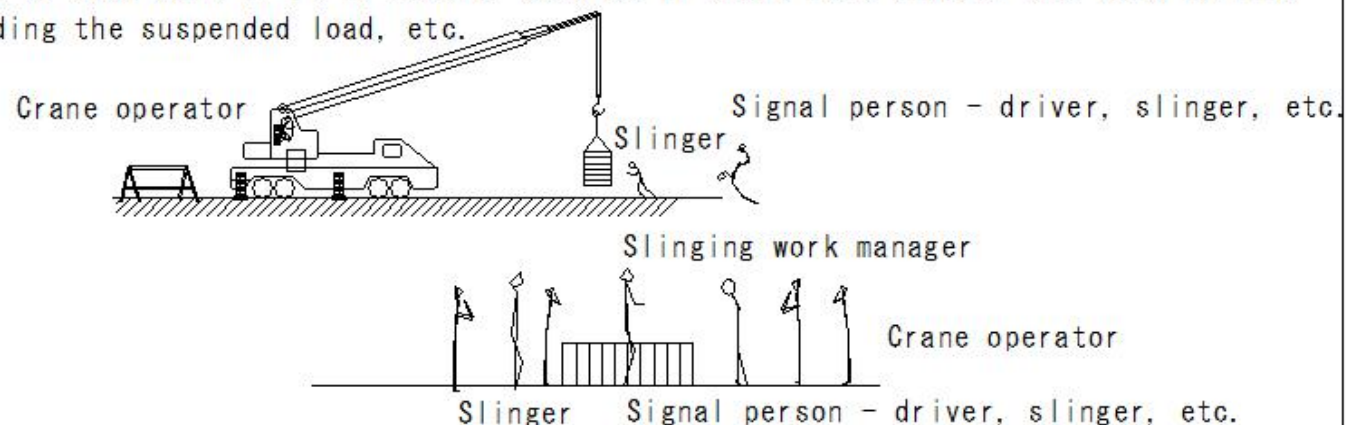
(S498)Guidelines for safety in slinging work

(S498)Guidelines for safety in slinging work

Guidelines for safety in slinging work

Prevention of industrial accidents

- ② The slinging work manager must carry out the work
- ① Check the suitability of the work instructions and the equipment,
and change or replace the equipment if necessary
- ② Check the crane installation status and the status of the load transport route,
and remove any defects or obstacles
- ③ Check the appropriate slinging method and give instructions for improvement
if it is inappropriate
- ④ Give instructions to stop work if it is unsafe, such as if there is a risk of the load falling
- ⑤ Measures for landing the suspended load, etc.



Pre-work meetings should be held to thoroughly explain the work content and procedures,
and ensure that everyone is fully aware of them

(S499)Guidelines for safety in slinging work

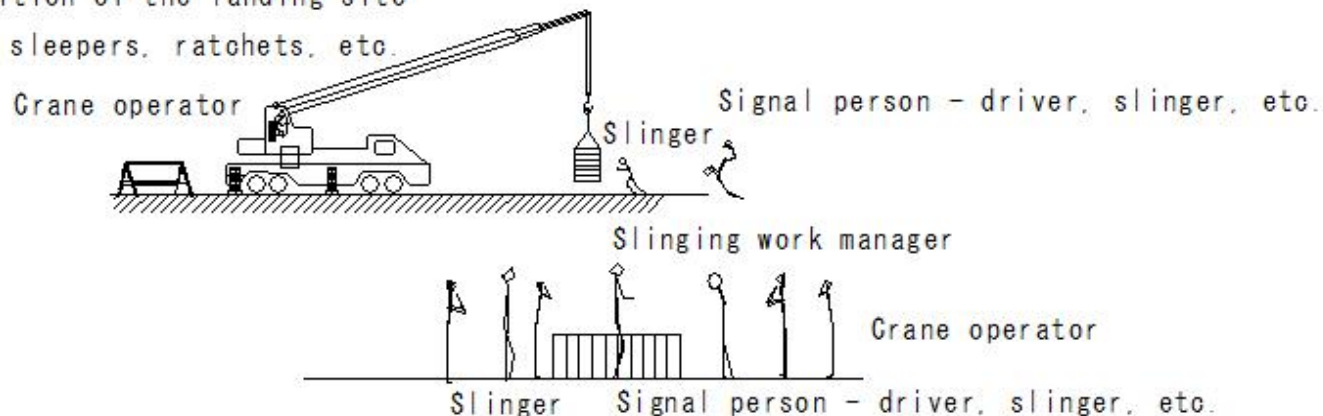
(S499) Guidelines for safety in slinging work

Guidelines for safety in slinging work

Prevention of industrial accidents

③ What the slinger must do

- ① Prepare and check the appropriate equipment
- ② Check the mass and shape of the sling
- ③ Request a change in slinging method, request to replace equipment
- ④ In case of cutting off the ground, after evacuating to a safe place, signal to the signaler
- ⑤ Check the safety of the suspended load
- ⑥ Redo if unsafe
- ⑦ Check the condition of the landing site
- ⑧ Arrangement of sleepers, ratchets, etc.



Cooperation between the slinger, signaler, and crane operator is extremely important to ensure the safety of slinging work

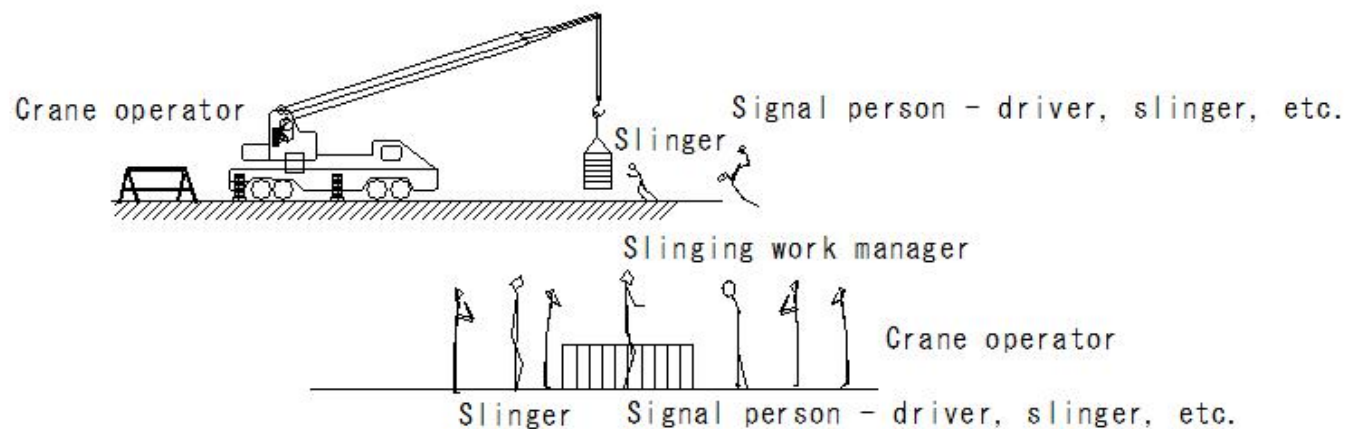
(S500)Guidelines for safety in slinging work

(S500)Guidelines for safety in slinging work

Guidelines for safety in slinging work

Prevention of industrial accidents

- ④ The signal person must be present
- ① Signal in a place where the operator and slinger can see
- ② Check the evacuation situation and the safety of the load transport route, and signal to the operator
- ③ Always check the safety of the load and transport route while guiding the load
- ④ Immediately signal to stop if the load becomes unstable
- ⑤ Check the load receiving location, and signal that the load has landed
- ⑥ The crane operator must confirm the signal by repeating it



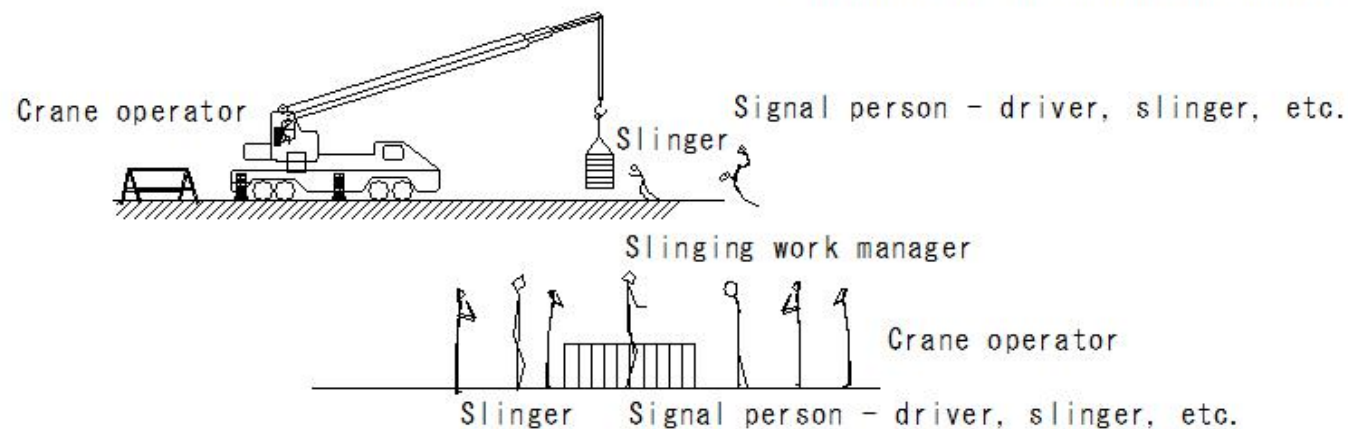
(S501)Guidelines for safety in slinging work

(S501)Guidelines for safety in slinging work

Guidelines for safety in slinging work

Prevention of industrial accidents

- ⑤ The crane operator must carry out the work
- ① Inspection before starting work
- ② Check the ground conditions for installation, reinforce the ground
- ③ Check the conditions of the work area including the transportation route,
and request the removal of obstacles, etc.
- ④ In case of a worker gets under the suspended load,
immediately stop operation and confirm evacuation
- ⑤ In case of there is a risk of exceeding the rated load, immediately stop operation
and contact the person in charge



(S502)Slinging procedure

(S502) Slinging procedure

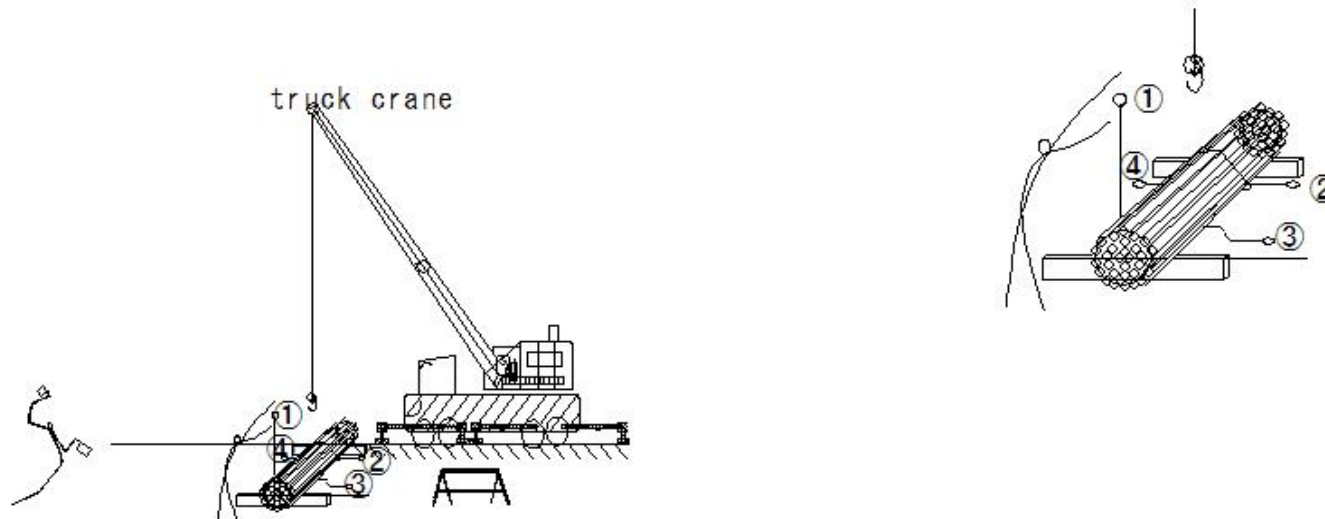
Sliding procedure

Prevention of industrial accidents

① Hang the eye of the slinging wire on the hook

- In case of the wire rope overlaps on the hook, hang it from the back of the hook in the correct order (① to ④) so that it does not get tangled under the hook

Order of hanging the eye on the hook



(S503)Slinging procedure

(S503)Slinging procedure

Procedures for slinging

Prevention of industrial accidents

② Slight lifting, stop immediately before ground clearance

- The load will swing at the moment of ground clearance, so workers should never enter narrow spaces
- Do not push or pull the load by hand, as this may cause the load to swing
- In case of checking the tension of the wire rope, do not grip the wire rope with your hands
- Check the slinging condition and correct any defects



Figure Checking the slinging condition
(Wire rope tension)

Check the tension by placing your hand on it
(Do not grip the wire with your hands)

(S504)Slinging procedure

(S504)Slinging procedure

Sliding work procedure

Prevention of industrial accidents

③ Slight lifting, stop once after lifting

- Lift the load slightly from the ground, stop once and check the stability of the load and the state of the slinging
- In case of there is a problem, correct it

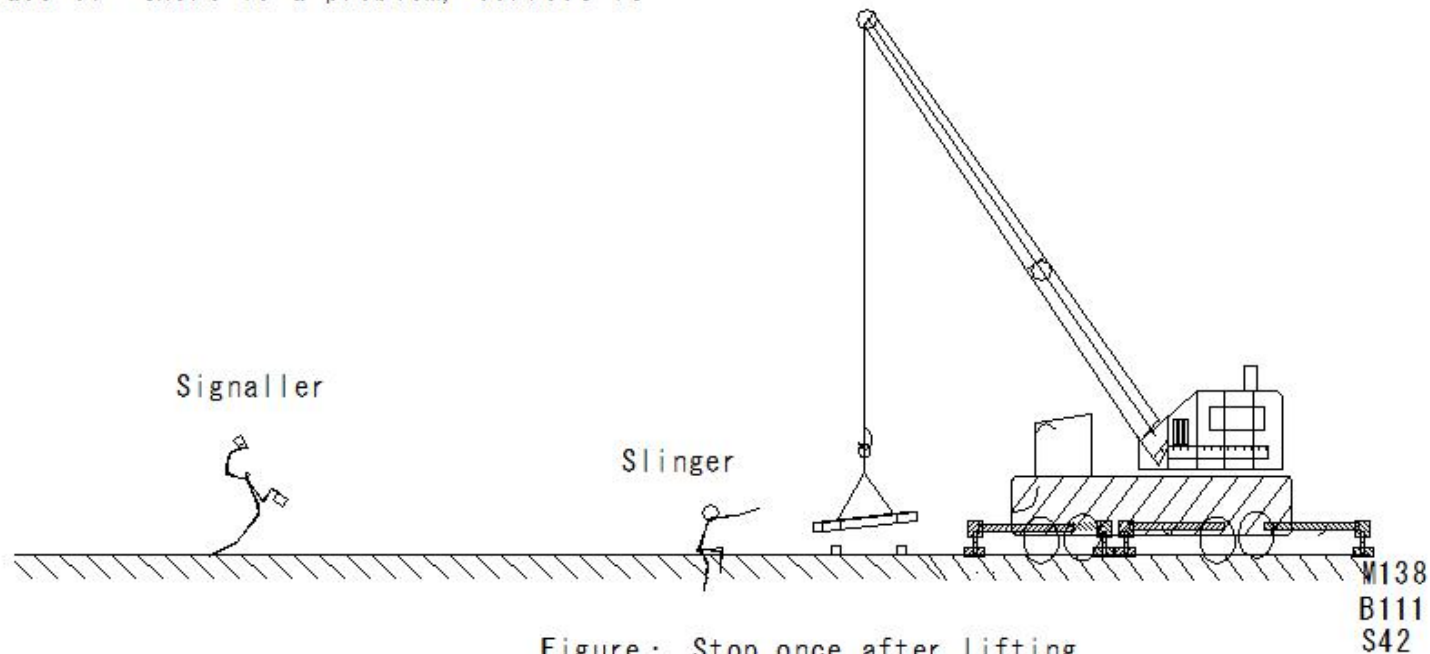


Figure: Stop once after lifting

(S505)Slinging procedure

(S505) Slinging procedure

Slinging work procedure

Prevention of industrial accidents

④ Hoisting and moving the load

Be careful that the load does not hit surrounding objects

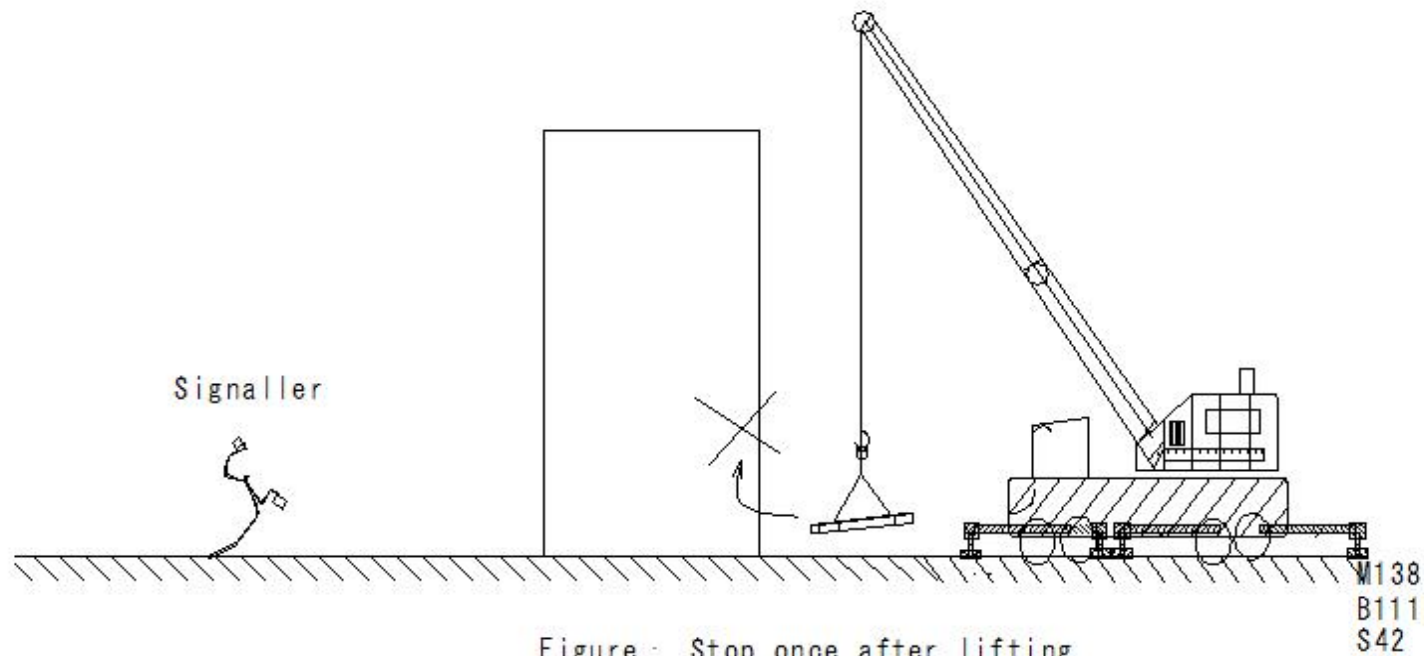


Figure : Stop once after lifting

(S506)Slinging procedure

(S506)Slinging procedure

Slinging work procedure

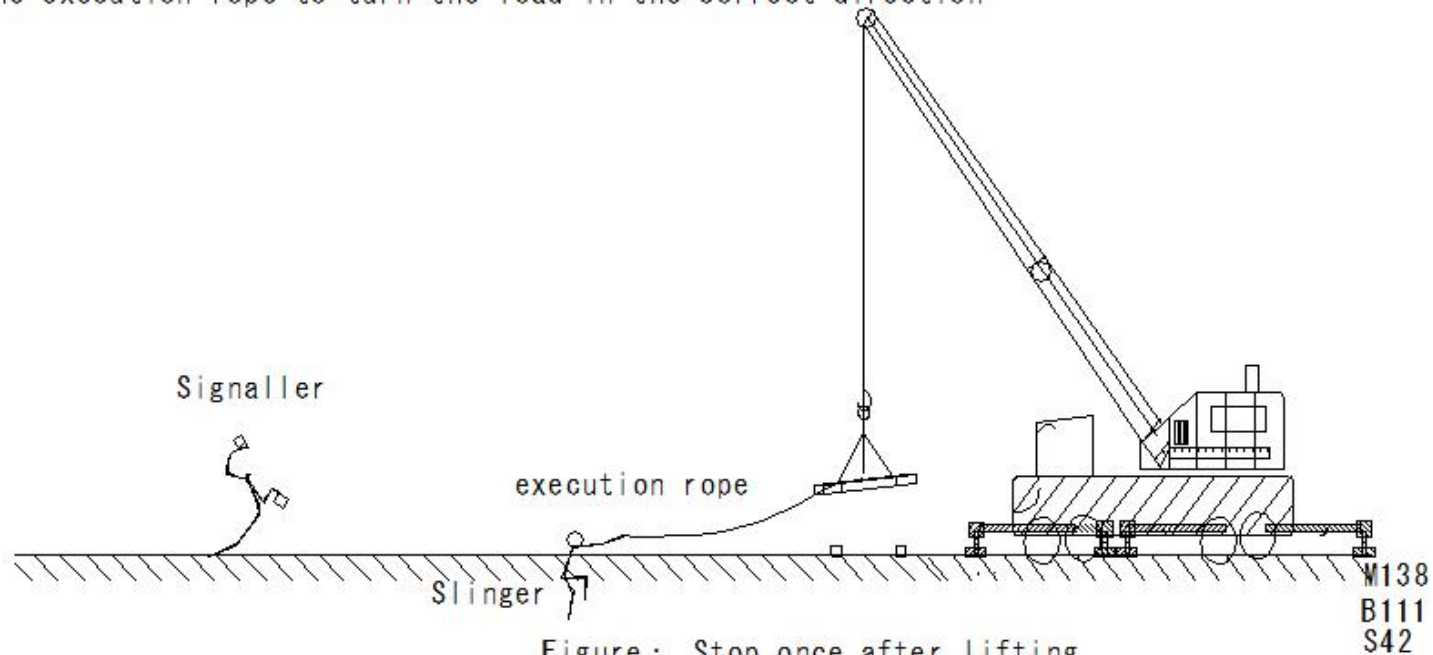
Prevention of industrial accidents

⑤ Wind down and stop before landing

Wind down slowly, being careful not to hit surrounding objects

Stop at a height that is easy to work at

Use the execution rope to turn the load in the correct direction



(S507)Slinging procedure

(S507)Slinging procedure

Procedures for slinging

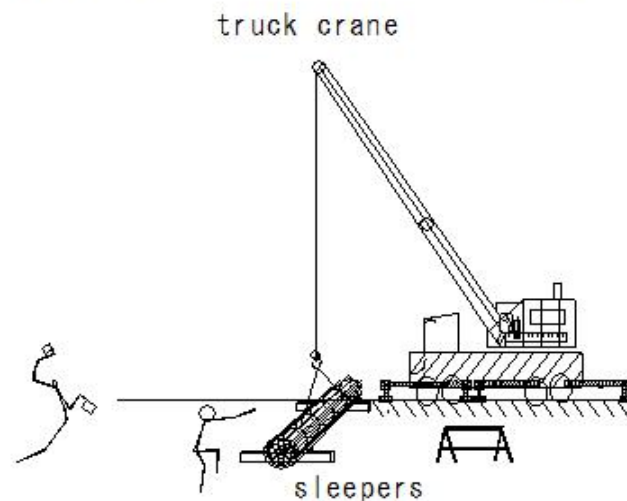
Prevention of industrial accidents

⑥ Slow winding down, stop once after landing

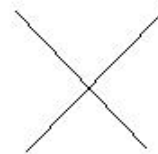
- Stop just before the load lands and check the position of the sleepers
- Land the load while watching its condition
- Stop with the wire rope taut

Check that the load is not crushed under the wire rope

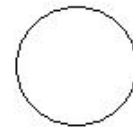
- Check the stability of the load with the wire rope slightly slackened
- Use ratchet stops to prevent round objects from rolling



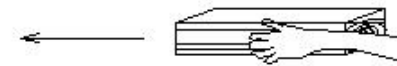
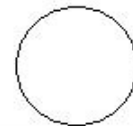
× Holding from above is dangerous



○ Hold with hands on both sides



○ Hold from the side with fingers



(S508)Slinging procedure

(S508)Slinging procedure

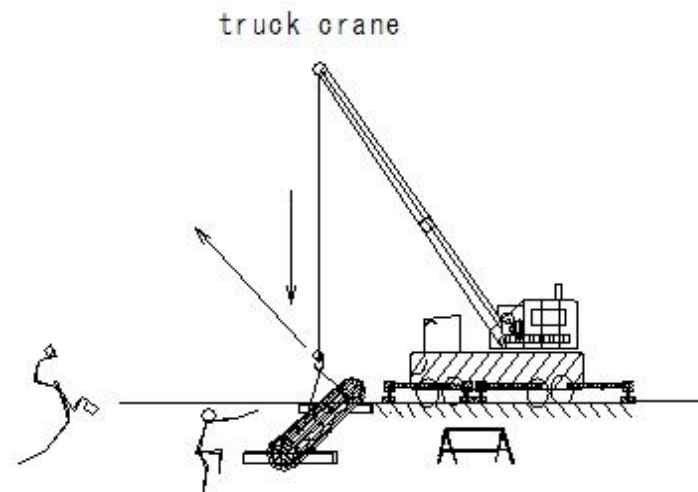
Procedures for slinging

Prevention of industrial accidents

⑦Lowering the hook and removing the slinging equipment

Lower the hook to a position where the slinging wire rope can be easily removed

Do not pull out the wire rope with a crane



(S509)Slinging method

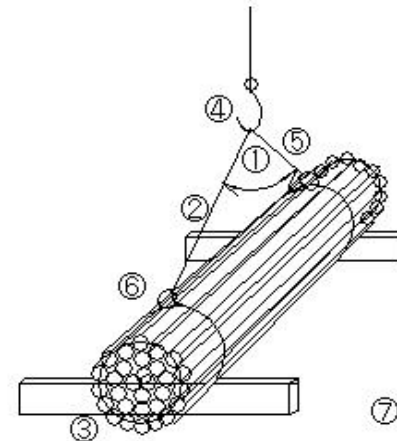
(S509)Slinging method

Slinging method

Basic precautions

- ① Lifting angle within 90° (recommended value 60°)
The tension on the wire rope changes depending on the lifting angle
- ② The wire rope is well tensioned.
- ③ When lifting from the ground, make sure the load is stable
- ④ Make sure the eye part is not heavy
- ⑤ The safety factor of the sling wire rope is 6 or more
- ⑥ The safety factor of the shackle is 5 or more
- ⑦ Ensure that the safety factor is appropriate for the slinging equipment

Wire rope with shackle



(S510)Slinging method

(S510)Slinging method

Slinging method

① 2-rope, 4-point wrap

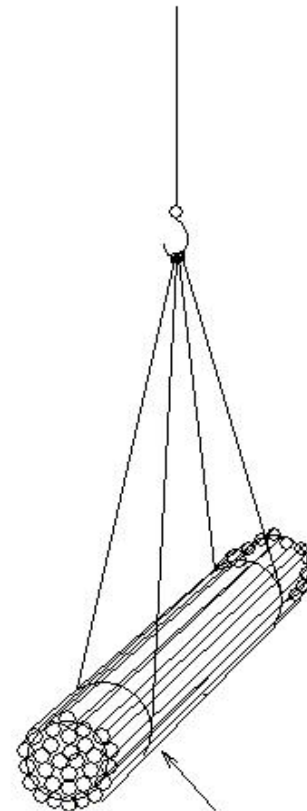
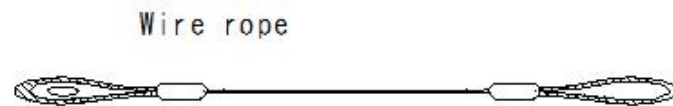
: Wrap the wire rope around the load once and hang it.

Advantages

- Prevents slipping
- Effective for long objects

Disadvantages

- The wire rope must be passed under the load twice
- Hang the wire rope so that it is not too heavy
- Secure both ends before lifting



Make sure that the wrapped part does not overlap the load

(S511)Slinging method

(S511)Slinging method

Slinging method

② 2-strand 2-point threading (4-strand 4-point shackle threading)

Through the eye or folded part of the sling wire rope

Through a shackle, etc., and sling the load so that it is squeezed

Advantages

- By squeezing the load, friction increases
Prevents the load and wire rope from slipping
- Can bundle long objects and multiple objects together

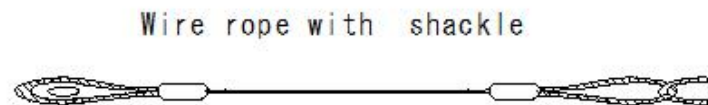
Disadvantages

- Strength of the intersection of the squeeze decreases
- Wire at the squeezed part is damaged

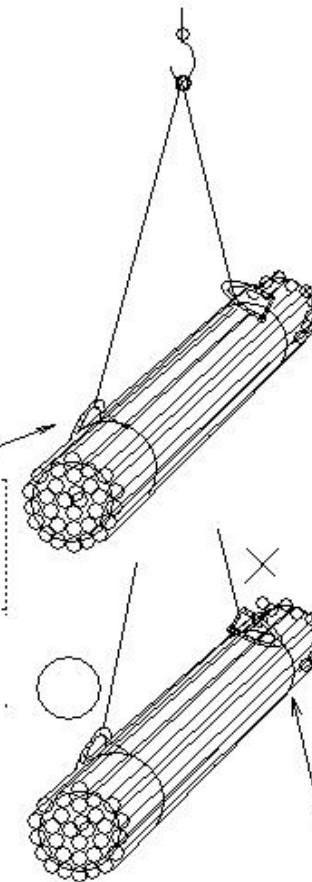
Points

- The load may rotate or twist depending on the direction of the squeeze, so consider the direction of the squeeze

Figure: Precautions when using a shackle at the threading part



In case of the rope is wound up, there is a risk that the eye bolt may loosen



(S512)Slinging method

(S512)Slinging method

Slinging method

② 2-strand 2-point threading (4-strand 4-point shackle threading)

Through the eye or folded part of the sling wire rope

Through a shackle, etc., and sling the load so that it is squeezed

Advantages

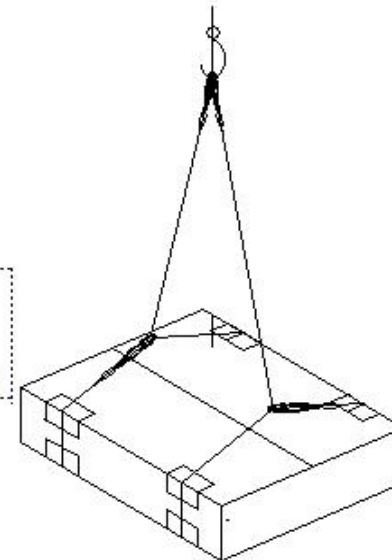
- By squeezing the load, friction increases
 - Prevents the load and wire rope from slipping
- Can bundle long objects and multiple objects together

Disadvantages

- Strength of the intersection of the squeeze decreases
- Wire at the squeezed part is damaged

Points

- The load may rotate or twist depending on the direction of the squeeze, so consider the direction of the squeeze



② 2-rod, 2-point threading
(4-rod, 4-point shackle)

Wire rope with shackle



(S513)Slinging method

(S513)Slinging method

Sliding method

② 2-strand 2-point threading (4-strand 4-point shackle threading)

Through the eye or folded part of the sling wire rope

Through a shackle, etc., and sling the load so that it is squeezed

Advantages

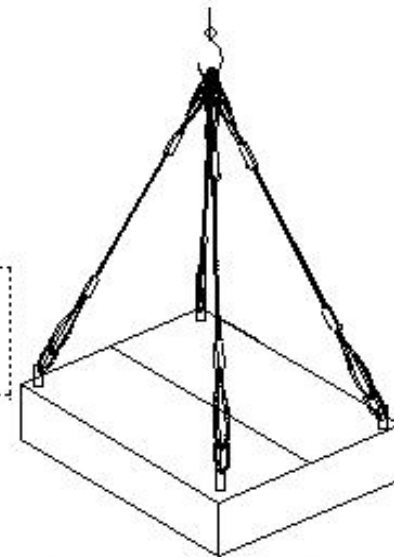
- By squeezing the load, friction increases
Prevents the load and wire rope from slipping
- Can bundle long objects and multiple objects together

Disadvantages

- Strength of the intersection of the squeeze decreases
- Wire at the squeezed part is damaged

Points

- The load may rotate or twist depending on the direction of the squeeze, so consider the direction of the squeeze



② 4-point shackle

The load should be applied vertically.

Wire rope with shackle



(S514)Slinging method

(S514)Slinging method

Slinging method

③ 2-rope, 4-point slinging: A method of slinging by wrapping the slinging wire rope around the load

Advantages

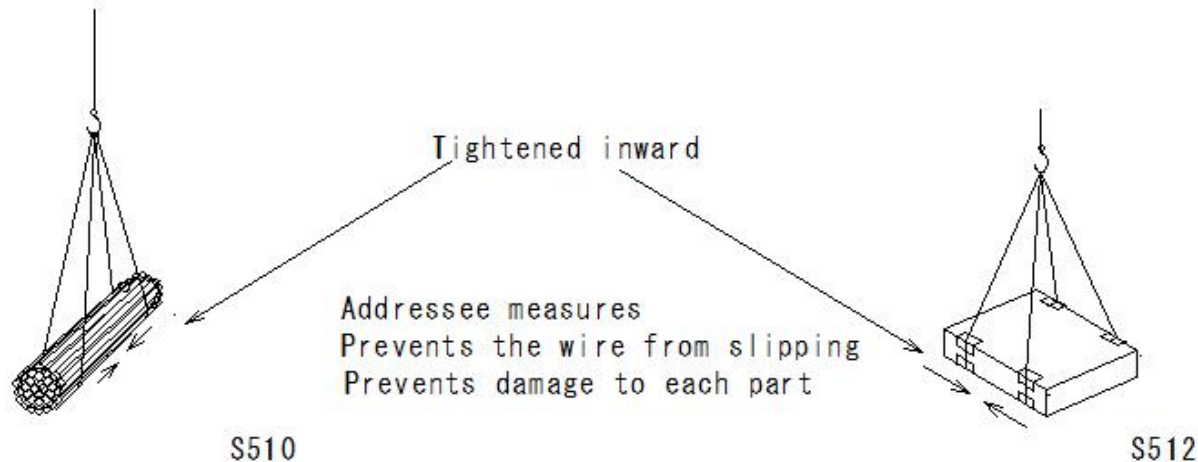
The simplest slinging method

Disadvantages

In case of the slinging angle is large, the wire ropes are pulled together and become slippery and unstable

Points

In case of the center of gravity of the load is off-centered or high the load may tip over, so it is necessary to determine the balance of the load



(S515)Slinging method

(S515)Slinging method

Slinging method

④ Aya-gake sling

A method of slinging a load by wrapping the sling wire rope around it once.

Advantages

- Best hanging method for disk-shaped objects

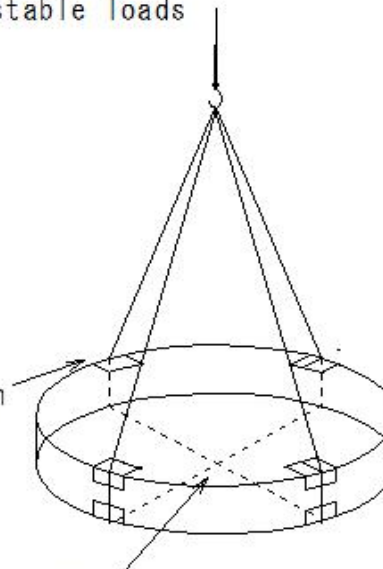
Disadvantages

- Strength of wire rope at crossing point is reduced, easily damaged
- Cylinders and cones with high center of gravity may cause unstable loads

Points

- Use wire ropes of the same length,
and make sure that crossing point of the sling
is directly under the center of gravity of the load
- Hang the wire rope so that it is spaced equally apart
- Rings or shackles may be used at the crossing points

Different lengths of wire ropes cause uneven tension



Twice the normal tension acts at the crossing points

(S516)Slinging method

(S516)Slinging method

Slinging method

⑤ 4-point slinging

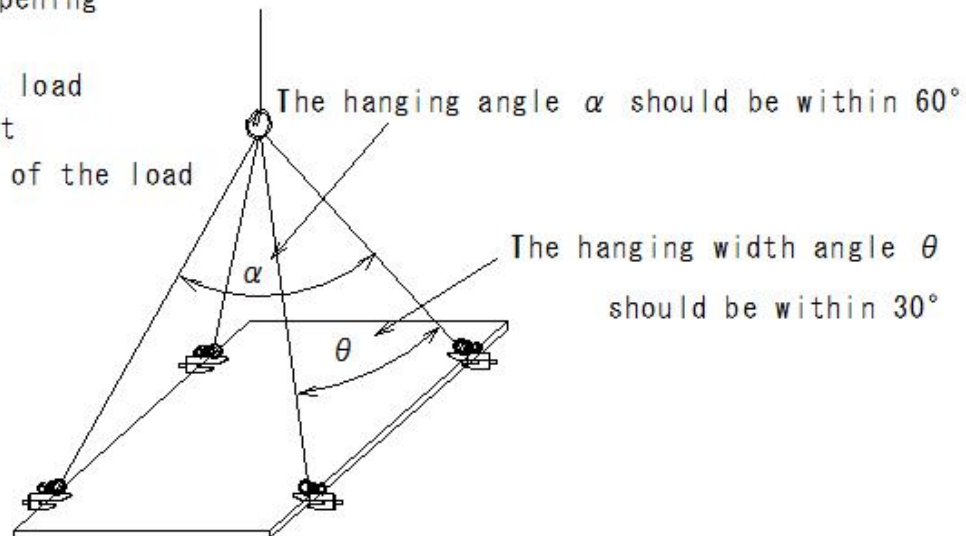
Points

- Strictly follow the load capacity and usage method specified by the manufacturer

Do not confuse vertical and horizontal slinging

- The slinging angle α should be within 60°
- In case of using horizontal slinging clamps, the hanging width angle θ should be within 30°
- Use within the allowable plate thickness range
- Insert the clamp all the way into the opening
- In case of slinging multiple pieces, make sure the center of gravity of the load is at the center of the hanging point
- Remove any attachments from the surface of the load

- Insert the clamp all the way
- Remove any attachments



(S517)Slinging method

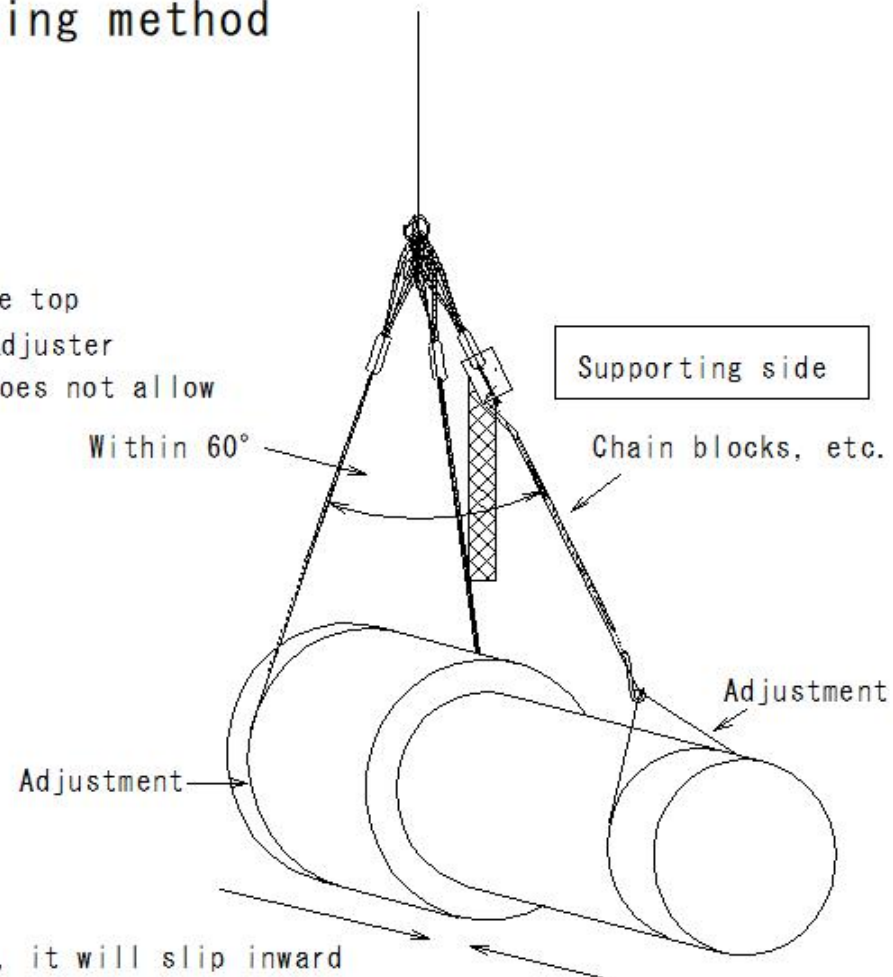
(S517)Slinging method

Slinging method

⑥ Three-point adjustable sling

Points

- Use the adjuster for chain blocks, etc. on the support side
- Hang the eye of the sling wire rope on the top and bottom hooks of the adjuster
- Use a slinging angle (within 60°) that does not allow the sling wire rope to slip sideways



(S518)Belt slings for lifting

(S518)Belt slings for lifting

About belt slings for lifting

Equipment of rings, etc.

Unless it has hooks, shackles, rings or eyes on both sides, it must not be used as a lifting tool



① Eye wire rope on both ends: Eye splice

S475



② Wire rope with shackle

S476



③ Eye wire rope on both ends: Compression stop

S477



④ Wire rope with hook

S478



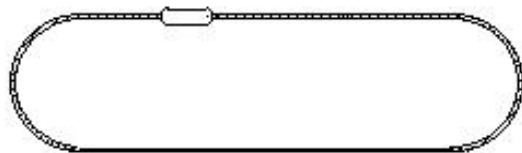
⑤ Wire rope with ring

S479



⑥ Chain with ring

S480



⑦ Endless wire rope

S481



⑧ Chain with hook

S482

(S519)Belt slings for lifting

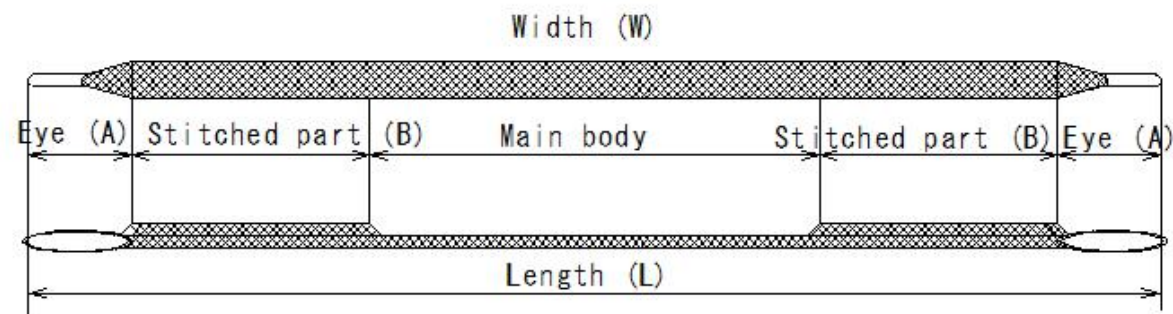
(S519)Belt slings for lifting

About belt slings for lifting

Do not use unsuitable fiber ropes, etc.

Those with broken strands

Those with significant damage or corrosion

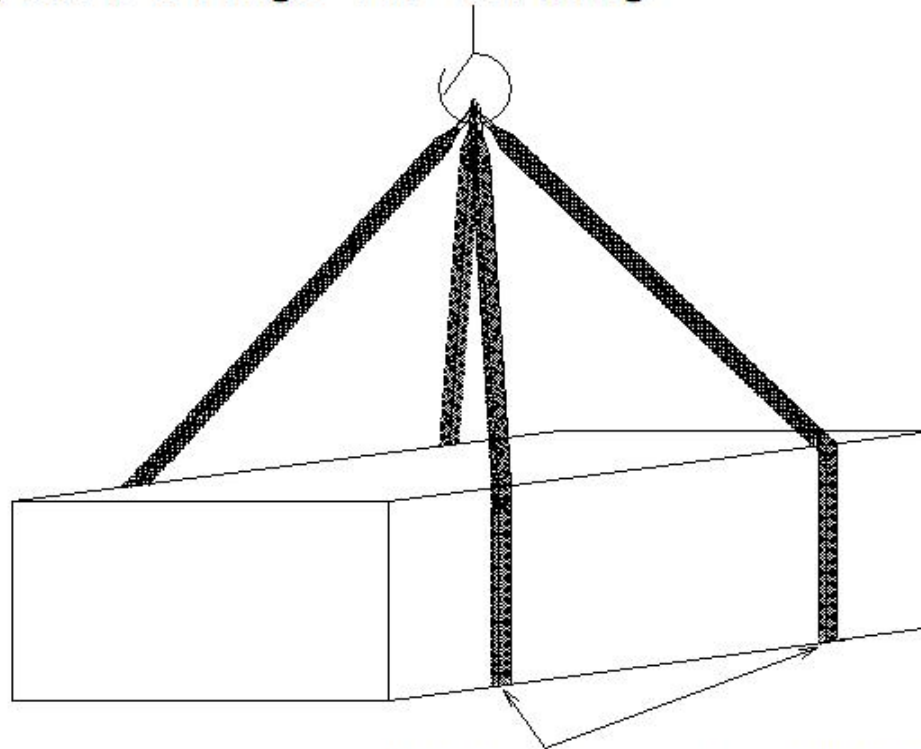


(S520)Belt slings for lifting

(S520)Belt slings for lifting

About belt slings for lifting

Indication of belt sling size



Protective corners are used on each part

(S521)Belt slings for lifting

(S521)Belt slings for lifting

About belt slings for lifting

Inspection before starting work

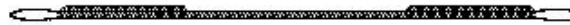
Inspection items

Is there any fuzz on the surface?

Is there any damage or peeling on the belt?

Are there any abnormalities in the stitching, eyes, or appearance?

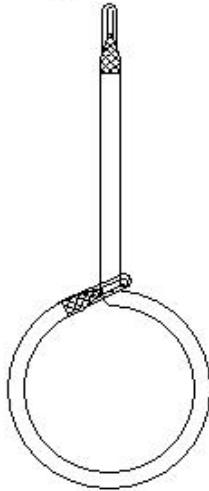
Is the tag display clear?



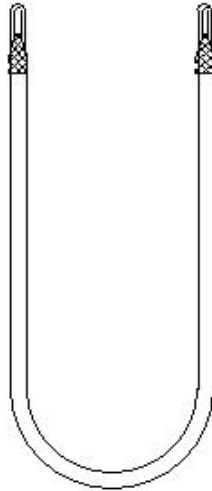
①



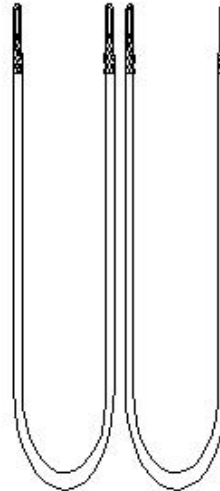
②



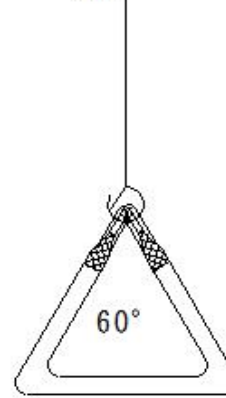
③



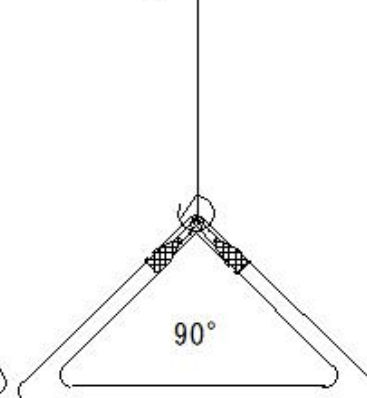
④



⑤



⑥

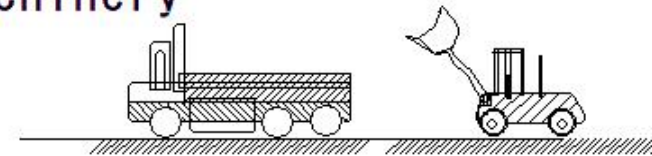


(S522)Construction machinery

(S522) Construction machinery

Classification of vehicle-based construction machinery

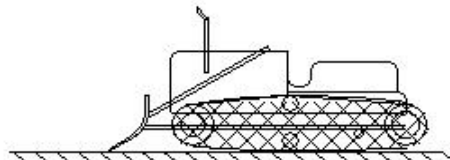
○Land leveling, transporting, and loading machinery



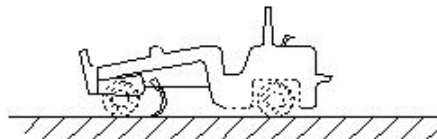
① Bulldozer

② Motor grader

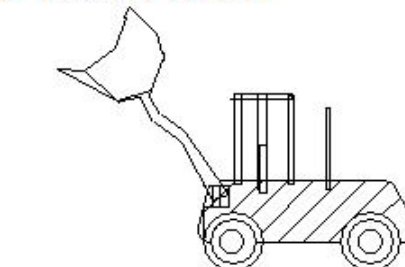
③ Tractor shovel



M133
E237



M110
E235

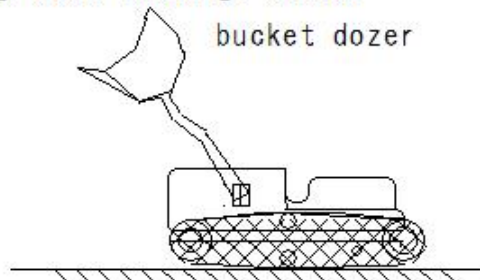


M133
E237

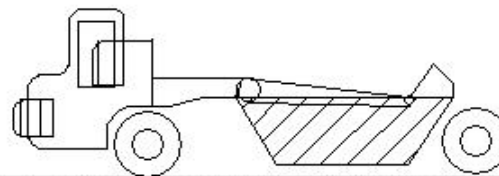
④ Muck loading: shovel
bucket dozer

⑤ Scraper
Motor Scraper

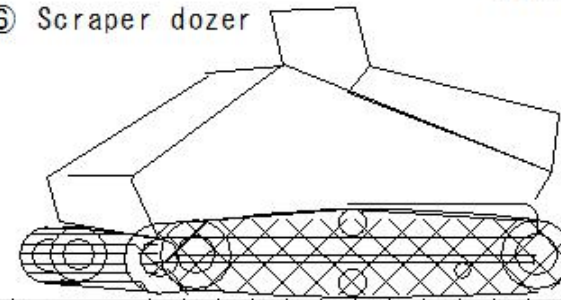
⑥ Scraper dozer



M133
E237



M133
E237



M133
E237

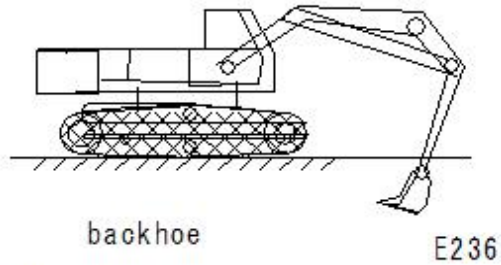
(S523)Construction machinery

(S523) Construction machinery

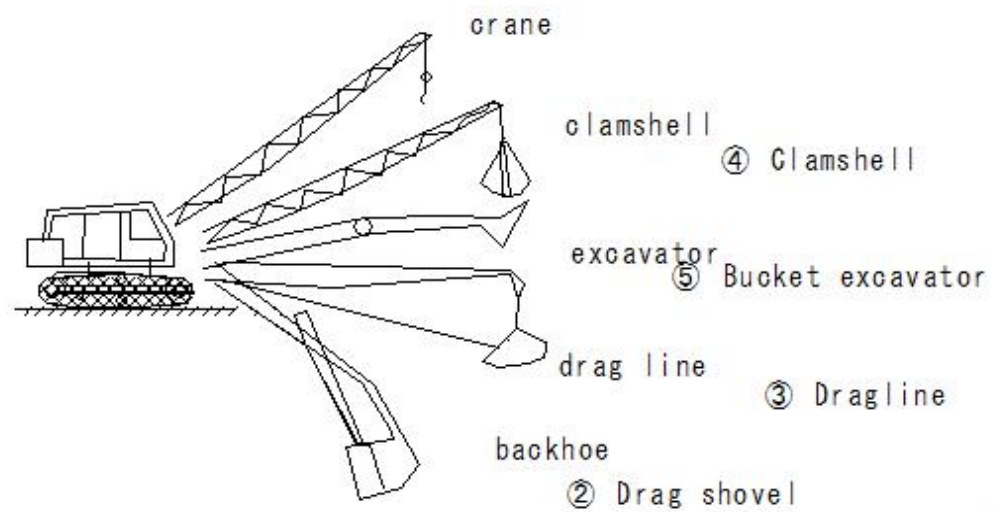
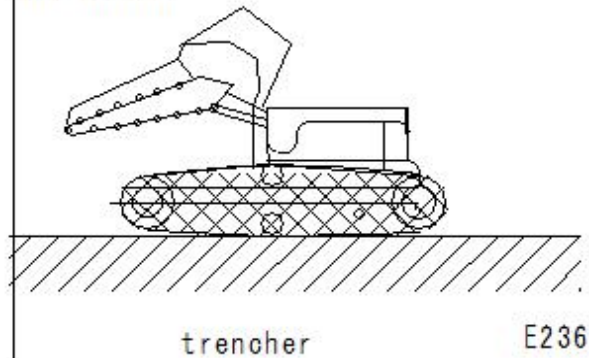
Classification of vehicle-type construction machinery

Excavation machinery

① Power shovel



⑥ Trencher



E241
M137

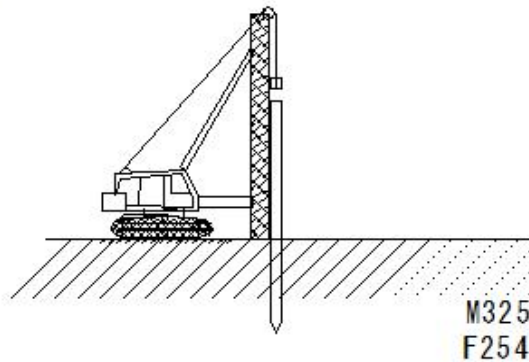
(S524)Construction machinery

(S524)Construction machinery

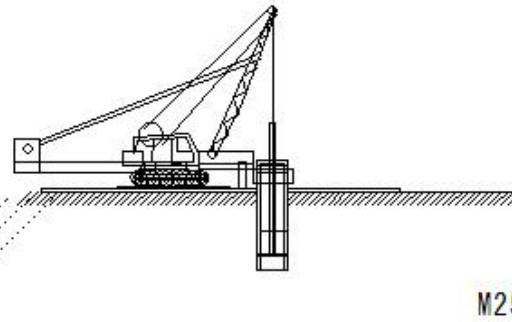
Classification of vehicle-mounted construction machinery

Foundation construction machinery

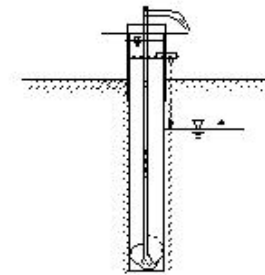
① Pile driver



② Earth drill

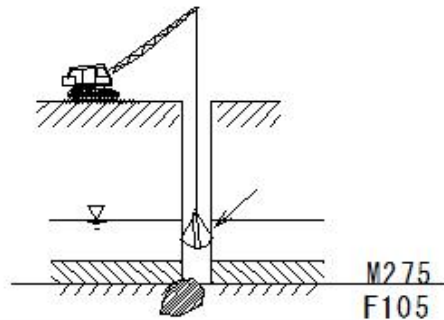


③ Reverse circulation drill

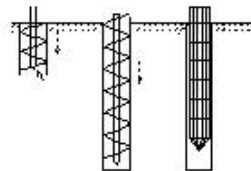


④ Drilling machine:

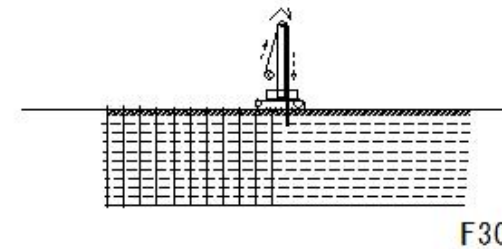
All-casing method
Benoto method



⑤ Earth auger



⑥ Paper drain



(S525)Construction machinery

(S525)Construction machinery

Classification of vehicle-mounted construction machinery

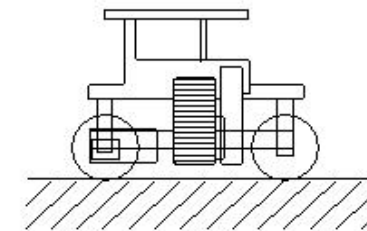
④ Compaction machinery ①tire rollers ②road rollers ③vibrating rollers ④tamping rollers

Compaction machinery and soil quality

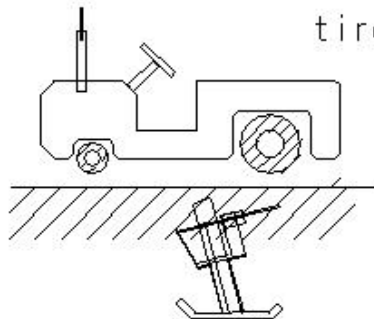
machine	Soil quality
tamping roller	hard clay
road roller	cobblestone-sandy soil
tire roller	gravel soil-clay soil
vibrating roller	cobblestone-sandy soil
vibrating compactor	gravel soil - sandy soil
rammer	gravel soil - sandy soil
bulldozer	cobblestone-sandy soil
Wetland bulldozer	soft clay



tamping roller

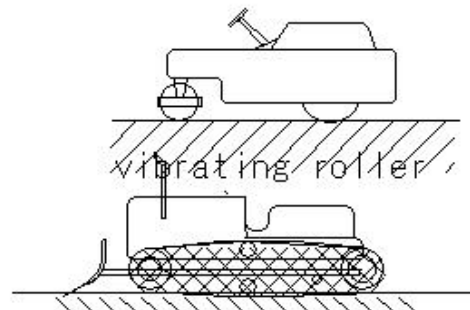


road roller



tire roller

rammer

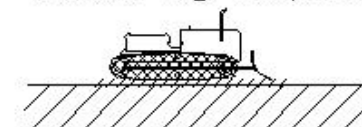


vibrating roller

bulldozer



vibrating compactor



Wetland bulldozer

M136

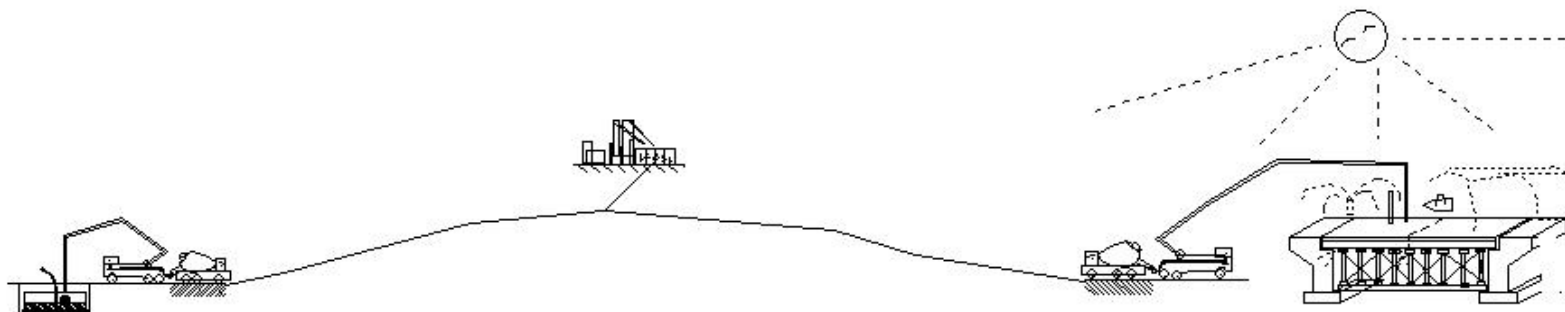
E240

(S526)Construction machinery

(S526)Construction machinery

Classification of vehicle-mounted construction machinery

⑤ Concrete pouring machines



① Concrete pump truck

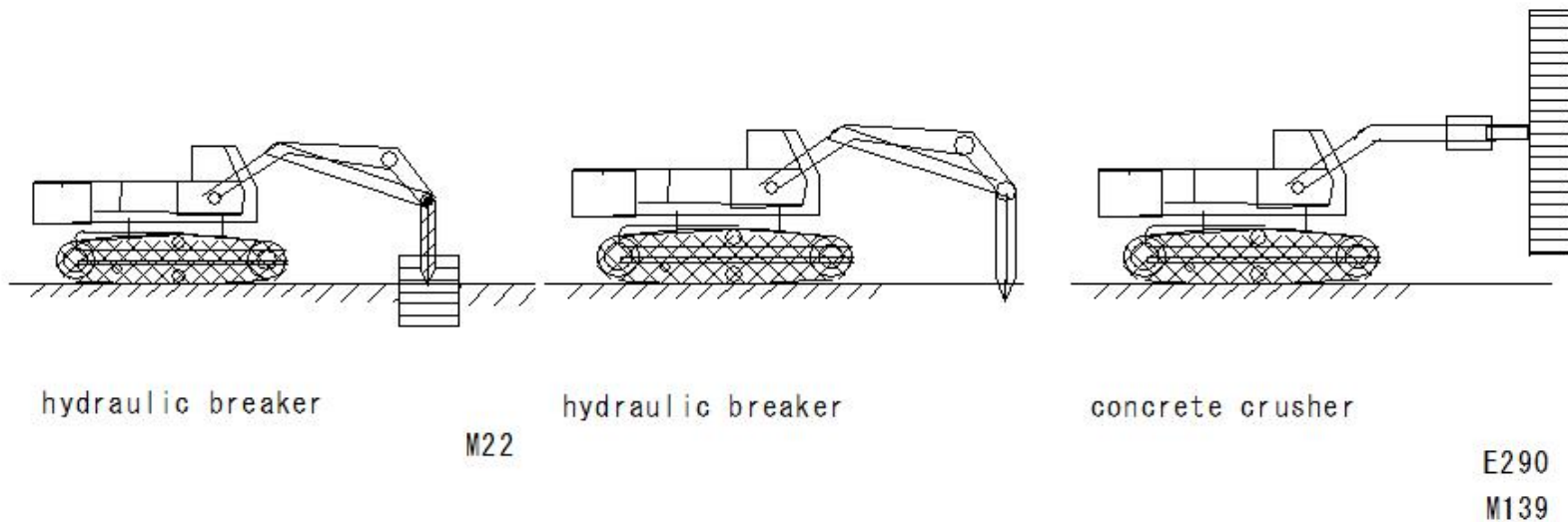
M356
M417

(S527)Construction machinery

(S527) Construction machinery

Classification of vehicle-mounted construction machinery

- ⑥ Demolition machines
 - ① Breakers
 - ② Steel frame cutting machines, concrete crushers
- Demolition grippers

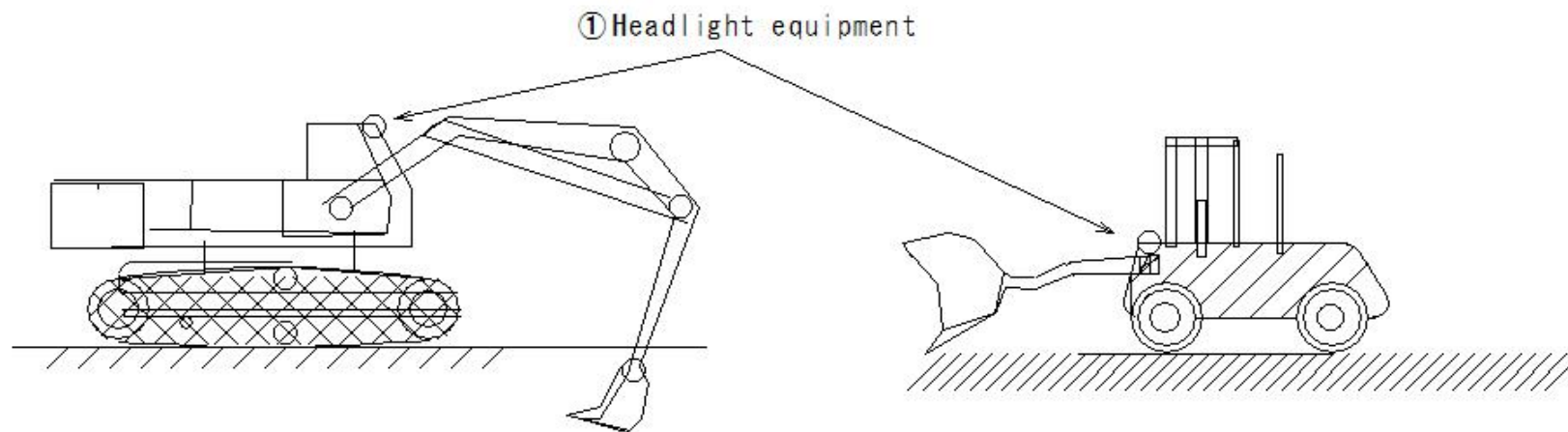


(S528)Safe operation-construction machinery

(S528) Safe operation-construction machinery

Safe operation of vehicle-based construction machinery

Headlight equipment



backhoe

Tractor excavator

S111

(S529)Safe operation-construction machinery

(S529)Safe operation-construction machinery

Safe operation of vehicle-mounted construction machinery

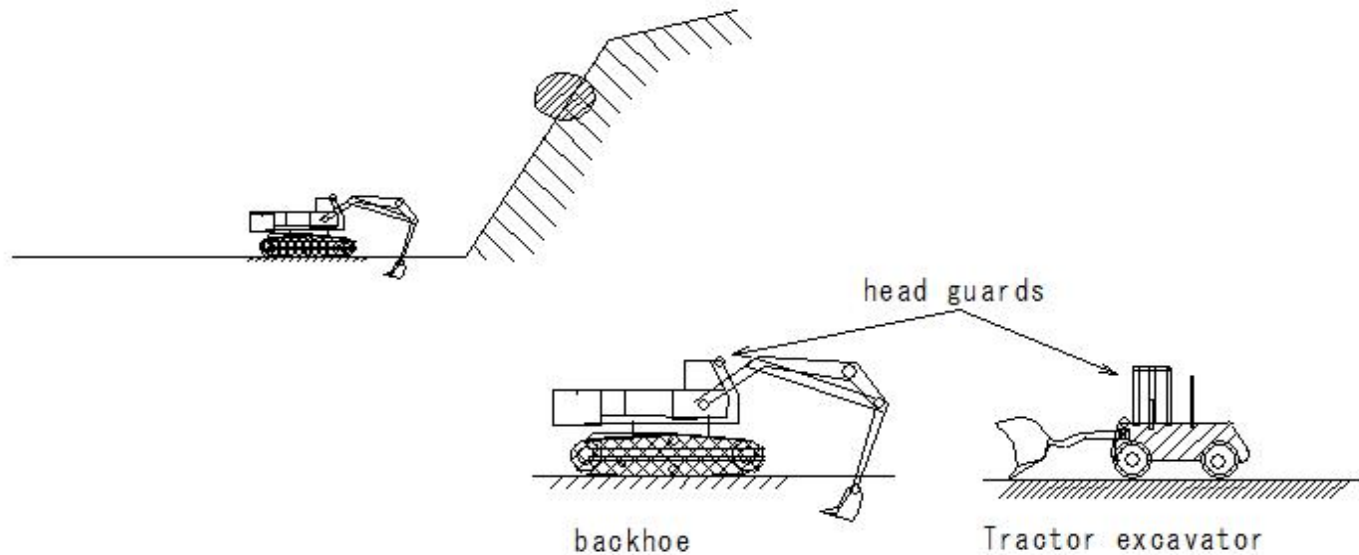
Installation of head guards

In cases of danger due to falling rocks, etc.

Applicable machinery

Bulldozers, tractor shovels, scraping machines, power shovels, drag shovels, demolition machines

Breakers, steel frame cutting machines, concrete crushers, demolition grabbers



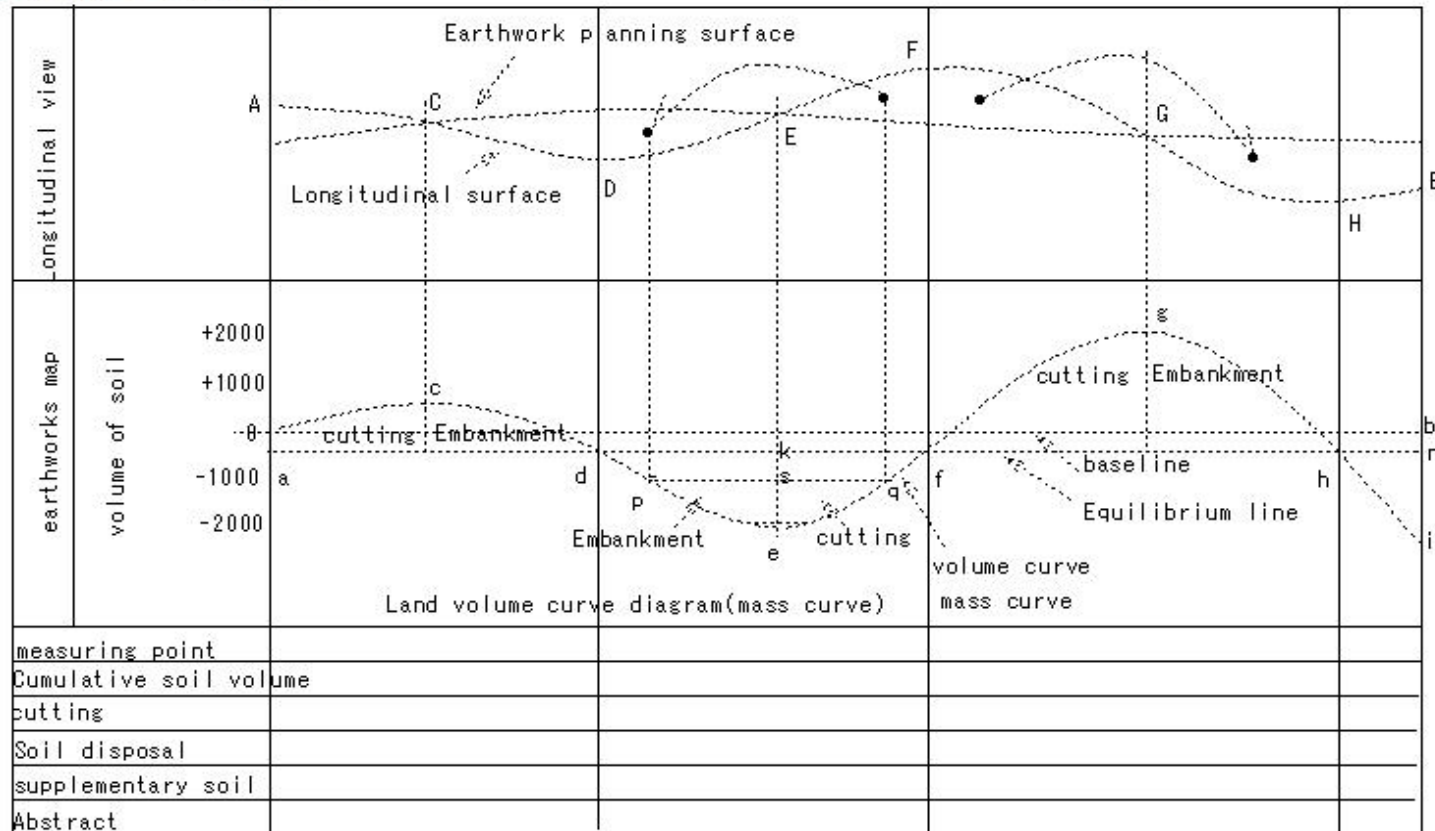
(S530)Safe operation-construction machinery

(S530) Safe operation-construction machinery

Safe operation of vehicle-mounted construction machinery

Investigation and recording of topographical and geological conditions

Applicable work plans



E336

(S531)Safe operation-construction machinery

(S531) Safe operation-construction machinery

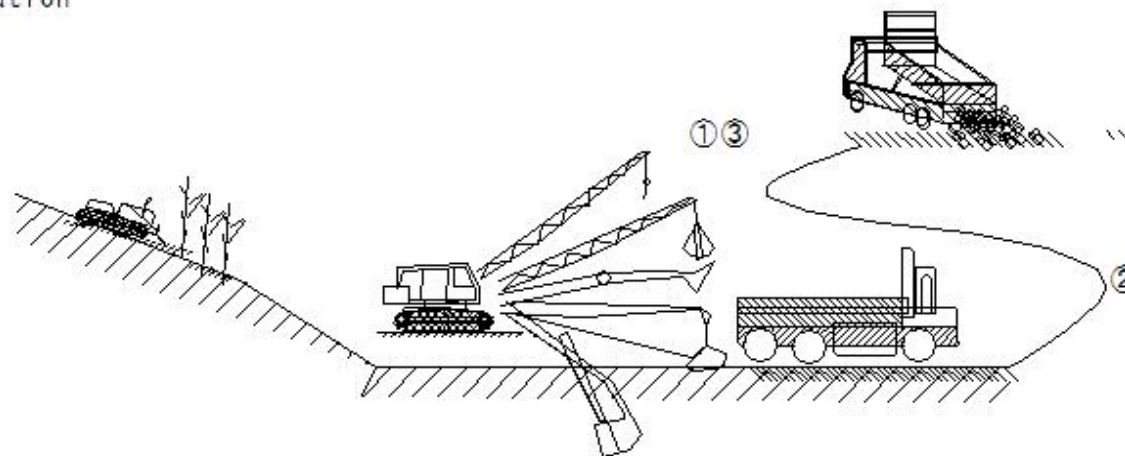
Safe operation of vehicle-mounted construction machinery

- Work plan

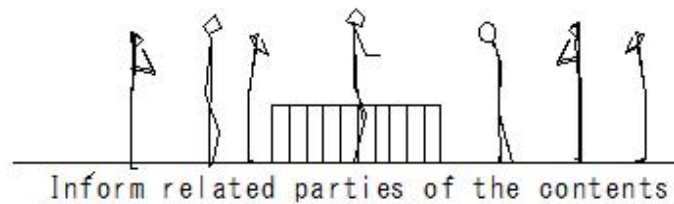
- ① Type and capacity of machine

- ② Route of operation

- ③ Work method



E340



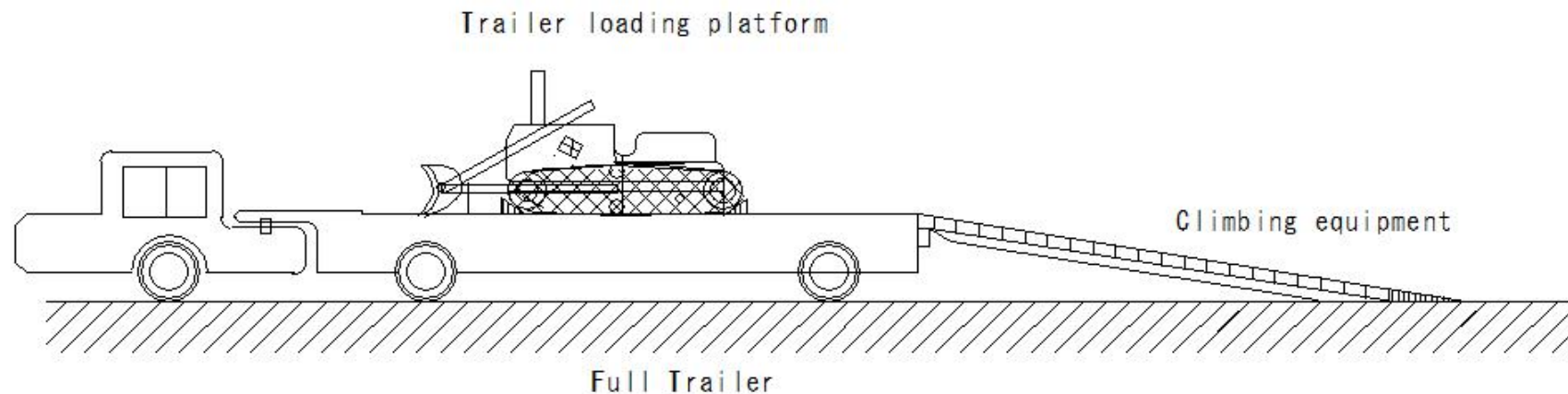
(S532) Safe operation-construction machinery

(S532) Safe operation-construction machinery

Safe operation of vehicle-mounted construction machinery

Transportation of machinery

- ① Load and unload on a flat surface
- ② In case of using a slope, ensure that it is of sufficient length and has an appropriate gradient
- ③ In case of using embankments or temporary platforms, ensure that the width, strength, and gradient are ensured



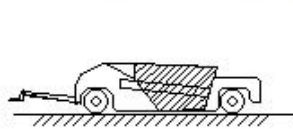
M394

(S533)Safe operation-construction machinery

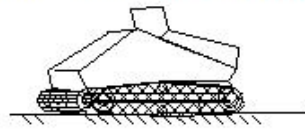
(S533) Safe operation-construction machinery

Safe operation of vehicle-mounted construction machinery

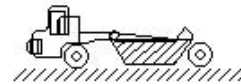
- Do not ride in any seat other than the passenger seat



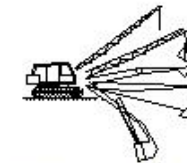
Towed scraper



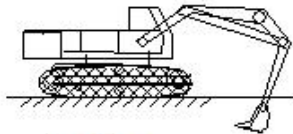
scrape dozer



motor scraper



Excavator



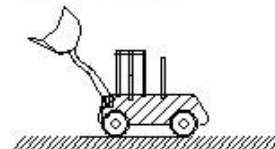
backhoe



drag line

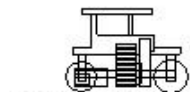


clamshell

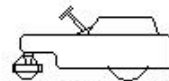


Tractor excavator
+ dump truck

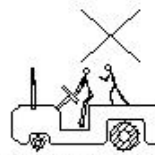
M10
E238



macadam roller



tandem roller



tire roller

M6
E186

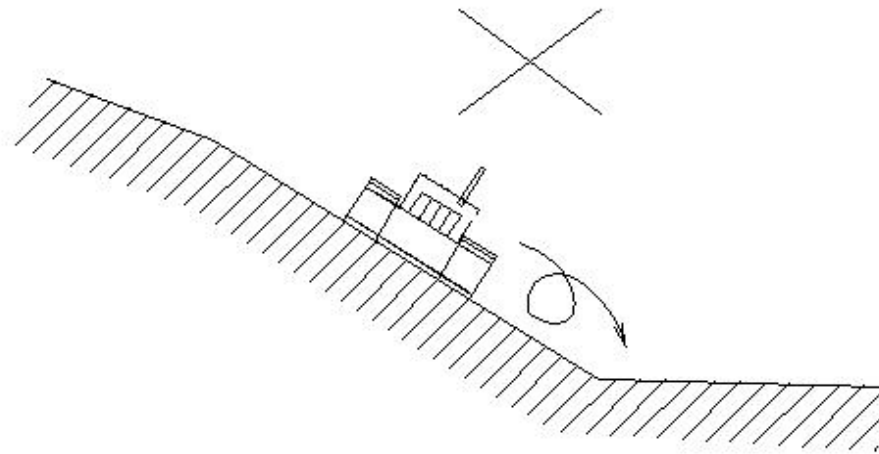
(S534)Safe operation-construction machinery

(S534) Safe operation-construction machinery

Safe operation of vehicle-type construction machinery

Restrictions on use

Maintain structural stability, maximum load capacity, etc.



E299

(S535)Safe operation-construction machinery

(S535) Safe operation-construction machinery

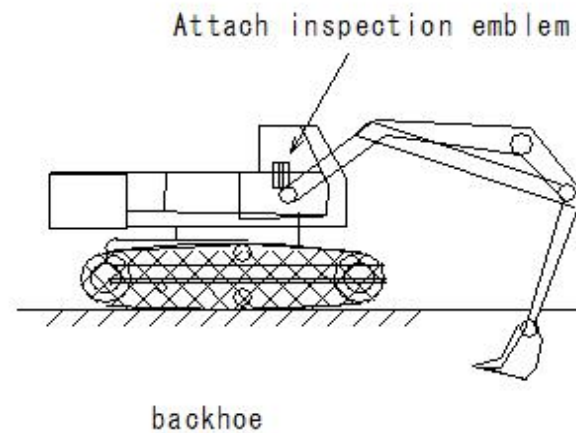
Safety work of vehicle-mounted construction machinery

Regular self-inspection

Regular self-inspection once per year

Monthly self-inspection once per month

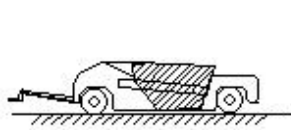
Specific self-inspection has regular self-inspection



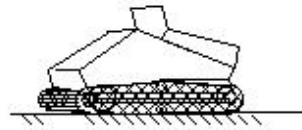
(S536)Safe operation-construction machinery

(S536) Safe operation-construction machinery

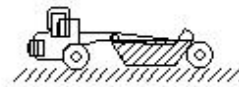
Safety work of vehicle-mounted construction machinery



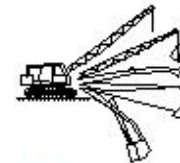
Towed scraper



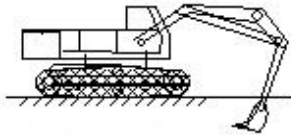
scrape dozer



motor scraper



Excavator



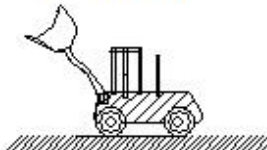
backhoe



drag line

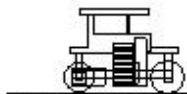


clamshell

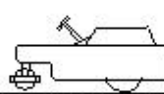


Tractor excavator
+ dump truck

M10
E238



macadam roller



tandem roller



tire roller

Record of regular self-inspection
Keep for 3 years

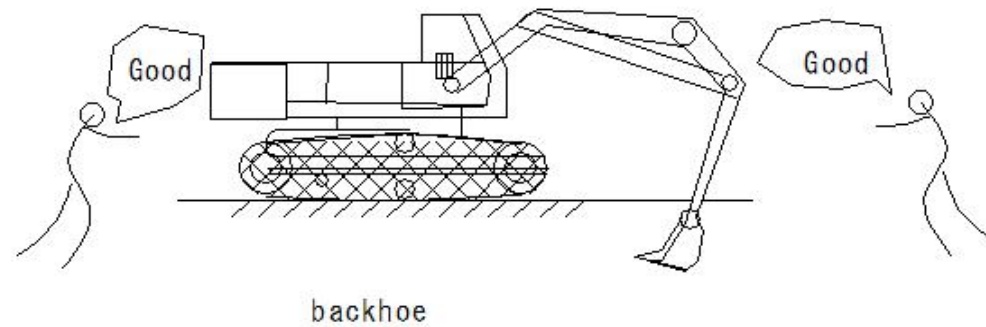
M6
E186

(S537)Safe operation-construction machinery

(S537) Safe operation-construction machinery

Safe operation of vehicle-mounted construction machinery

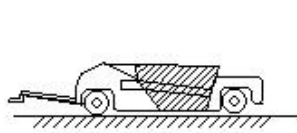
Inspection before starting work



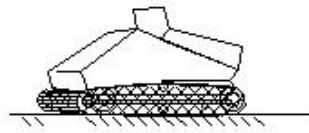
(S538)Safe operation-construction machinery

(S538) Safe operation-construction machinery

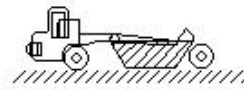
Safe operation of vehicle-mounted construction machinery



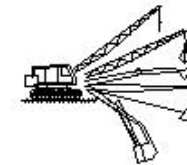
Towed scraper



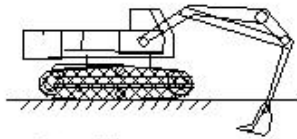
scrape dozer



motor scraper



Excavator



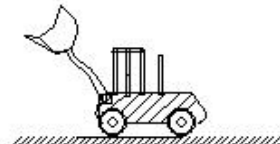
backhoe



drag line

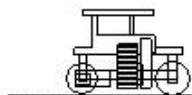


clamshell

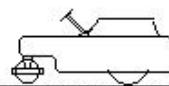


Tractor excavator
+ dump truck

M10
E238



macadam roller



tandem roller



tire roller

Repairs, etc.
Voluntary inspection:
If there is an abnormality during inspection,
repair it immediately



M6
E186

(S539)Safe operation-construction machinery

(S539) Safe operation-construction machinery

Safe work with vehicle-type construction machinery

Repair or attachment installation and removal work

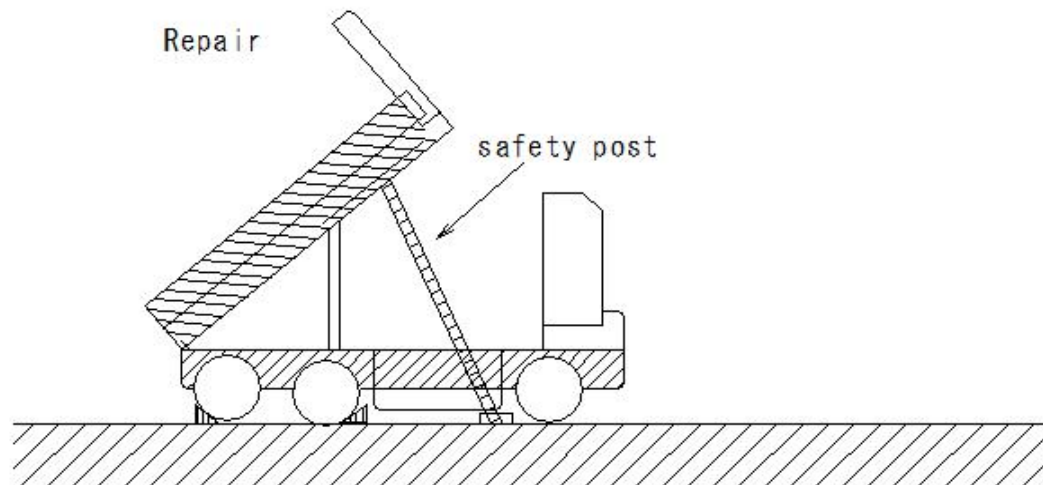
Employer → Designation

Work supervisor → Worker

Duties

Define work procedures

Use of safety posts, safety blocks, and platforms



E340

(S540)Safe operation-construction machinery

(S540) Safe operation-construction machinery

Safe operation of vehicle-type construction machinery

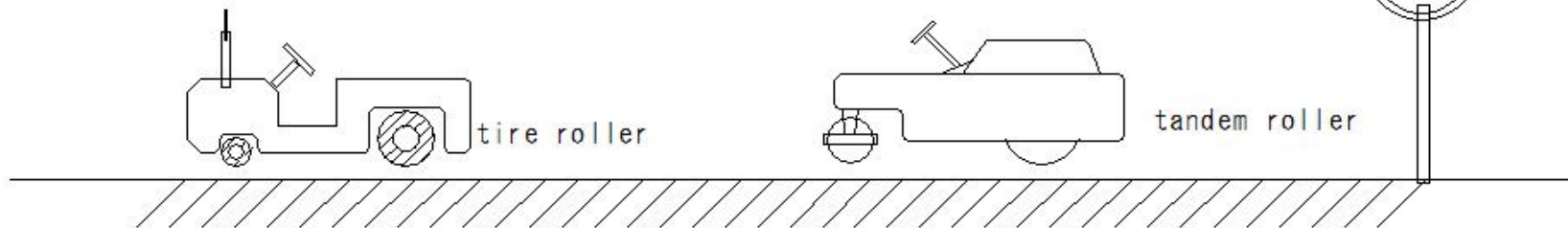
Repair or attachment installation and removal work

Speed limit

Determined according to topography, geological conditions, etc.

Maximum speeds of 10km/h or less

Maximum speeds of 10km/h or less



M122
E215

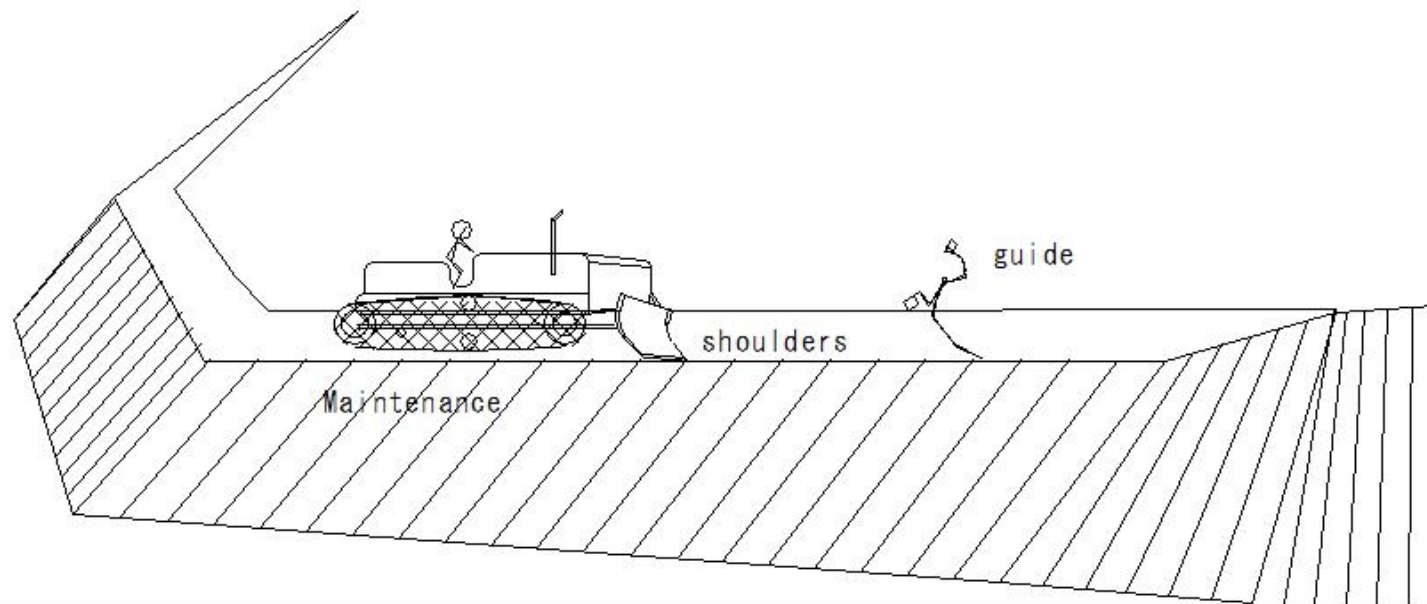
(S541)Safe operation-construction machinery

(S541) Safe operation-construction machinery

Safe operation of vehicle-mounted construction machinery

Prevention of tipping or falling

1. Prevention of collapse of road shoulders and uneven settlement of strata
2. Maintenance of necessary road shoulders
3. Place guides to guide workers
4. Use of machinery equipped with protective structures and seat belts in case of tipping

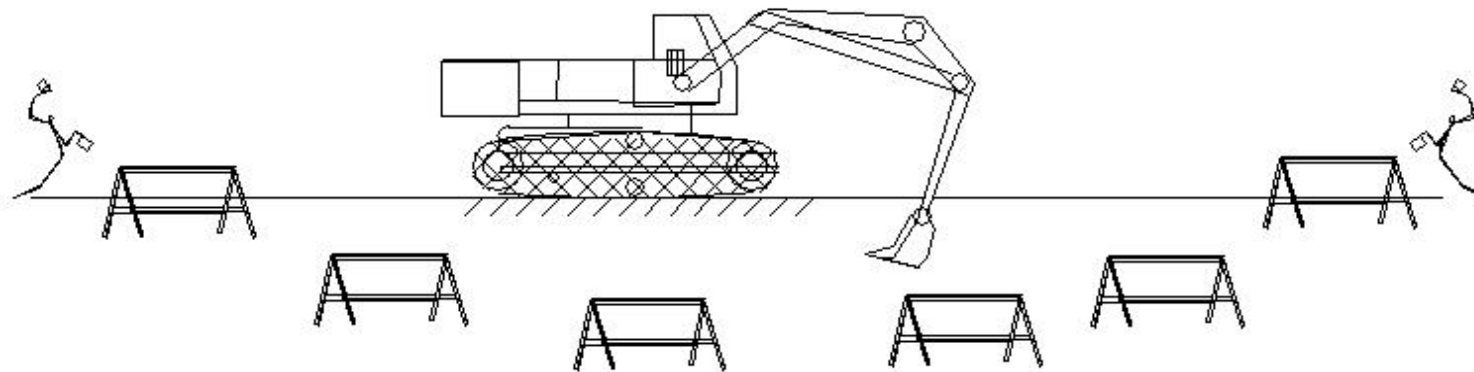


(S542)Safe operation-construction machinery

(S542) Safe operation-construction machinery

Safe operation of vehicle-type construction machinery

Prevention of contact



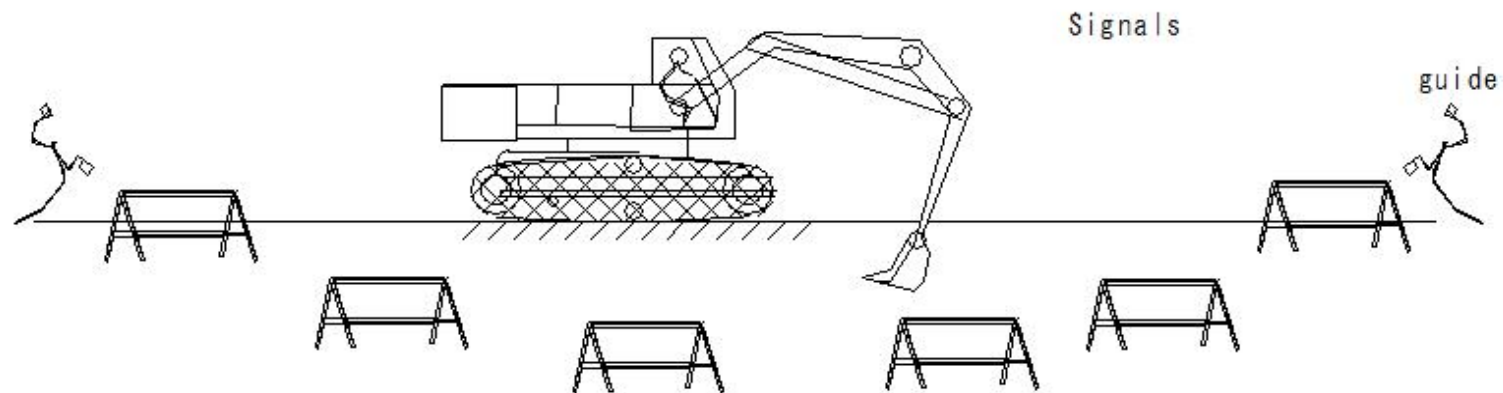
① No entry or placement of guides

(S543)Safe operation-construction machinery

(S543) Safe operation-construction machinery

Safe work on vehicle-mounted construction machinery

Signals



① In case of assigning a guide, set a certain signal and have the guide do it

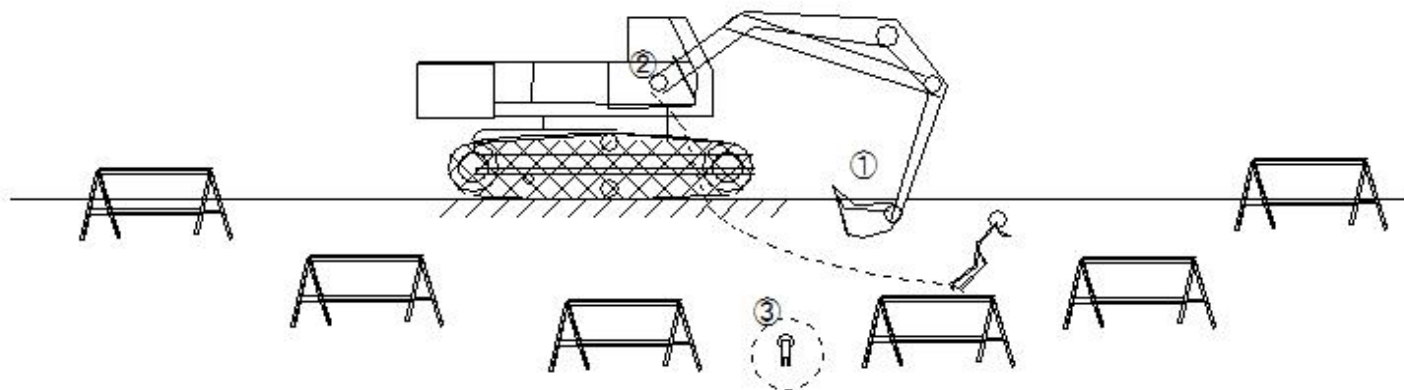
(S544)Safe operation-construction machinery

(S544) Safe operation-construction machinery

Safe work on vehicle-mounted construction machinery

Measures to take when leaving the driving position

- ① Lower the bucket, etc. to the ground
- ② Stop the engine and apply the driving brake to prevent the machine from running away
- ③ Remove the key



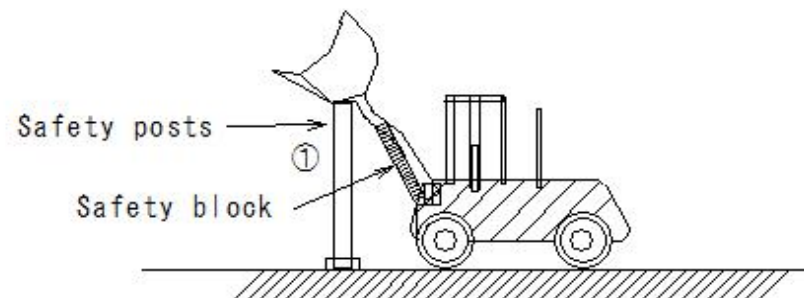
(S545) Safe operation-construction machinery

(S545) Safe operation-construction machinery

Safe work on vehicle-mounted construction machinery

Repair or attachment installation and removal work

Prevention of danger due to the descent of the boom, etc.



① Use safety posts and safety blocks when repairing and inspecting
Safety block

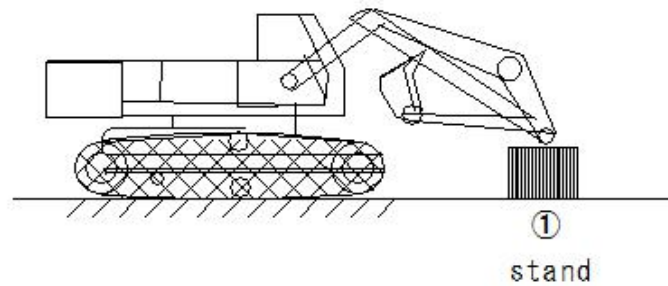
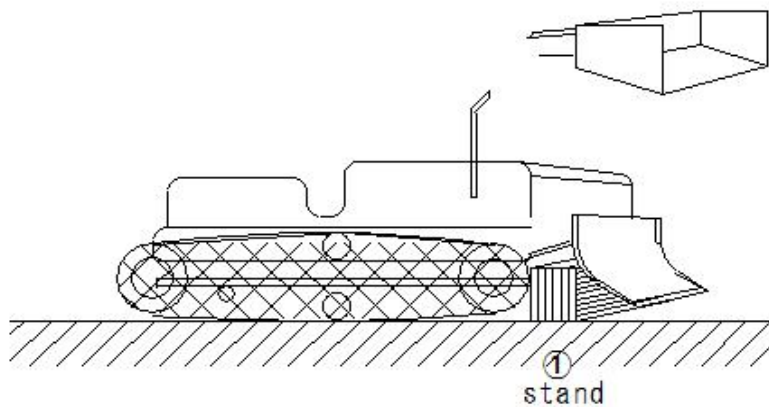
Tractor excavator

(S546) Safe operation-construction machinery

(S546) Safe operation-construction machinery

Safe work with vehicle-mounted construction machinery

Safe work with vehicle-mounted construction machinery



① Use a stand when installing or removing attachments

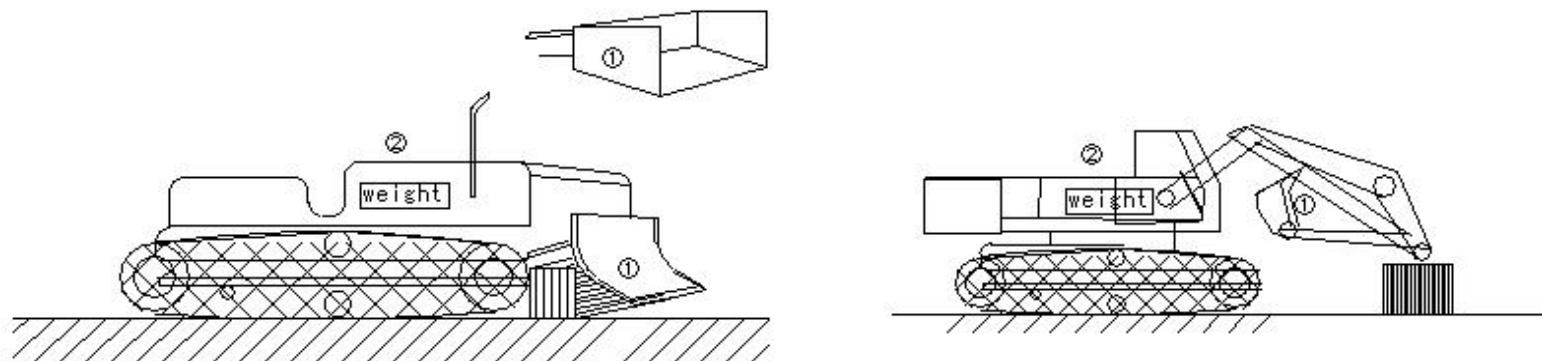
(S547)Safe operation-construction machinery

(S547)Safe operation-construction machinery

Safe work with vehicle-mounted construction machinery

Repair or attachment installation and removal work

Attachment installation restrictions and weight indication



- ① Do not install attachments that exceed the specified weight
- ② Display weight in a visible location

(S548)Restrictions on use other than the primary purpose (lifting work)

(S548)Restrictions on use other than the primary purpose (lifting work)

Restrictions on use other than the primary purpose (lifting work)

Lifting loads with a drag shovel (backhoe)

Lifting people with a clamshell, etc.

Vehicle-mounted construction machinery must not be used for anything other
than the primary purpose of the machinery

Lifting work (turning and traveling) is permitted when the following two conditions are met

① In case of it is unavoidable for the work or when it is necessary

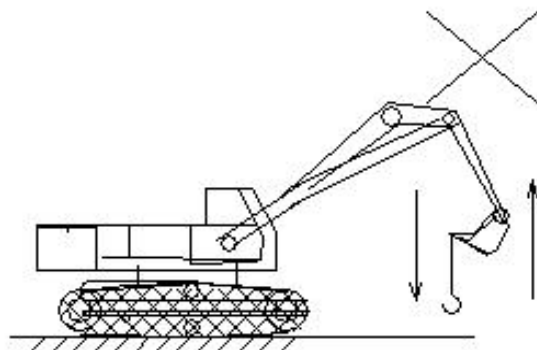
for the safe performance of the work

Work to temporarily lift sheet piles for retaining soil, huge pipes, etc.

to reduce the risk of landslides

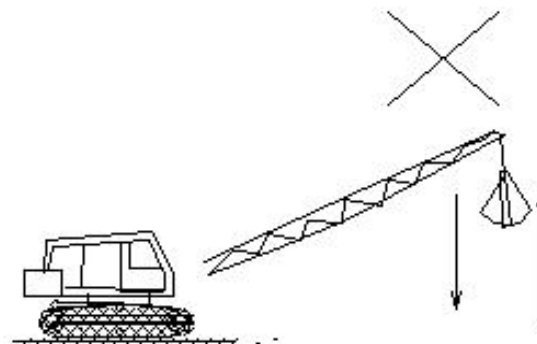
In case of bringing in a mobile crane to work would make the work area more complicated

and dangerous



backhoe

E236



clamshell

E241

M137

(S549)Restrictions on use other than the primary purpose (lifting work)

(S549)Restrictions on use other than the primary purpose (lifting work)

Restrictions on use other than the main purpose (lifting work)

Lifting loads with a drag shovel (backhoe)

○ In case of all the measures in the figure have been taken as safety measures

① Check hooks, etc. before starting work

⑧ Turn at low speed

② The following hooks, etc. must be present

⑨ Operator qualifications

○ Sufficient strength (safety factor 5 or more)

○ Completion of technical training or special education for vehicle-type construction machinery

○ Anti-slip device

○ Attachment by welding

⑩ No entry area

③ Slings supervisor

○ Person who has completed slinging skills training

○ Contact with suspended load

④ Attach a backup rope

○ Falling suspended load

⑤ Maximum load is less than 1 ton

○ Contact with machinery

⑥ In case of using a slinging chain

⑪ Flat area

○ Safety Total factor 5 or 4 or more

⑫ Establish a signal

○ Stretching 5% or less

○ Designate a signal person

○ Reduction in link cross-sectional diameter 10% or less

○ No cracks

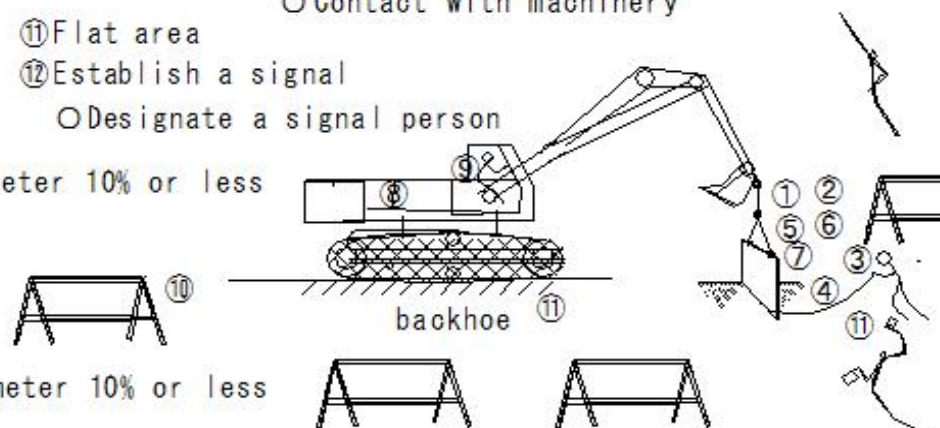
⑦ In case of using wire rope for slinging

○ Safety factor 5 or 4 or more

○ Stretching 5% or less

○ Reduction in link cross-sectional diameter 10% or less

○ No cracks



(S550)Restrictions on use other than the primary purpose (lifting work)

(S550)Restrictions on use other than the primary purpose (lifting work)

Restrictions on use other than the main purpose (assembly and dismantling of earth retaining supports)

Restrictions on use other than the main purpose

○ In case of there is no risk of danger to workers

○ Safety measures

① Work methods that do not damage the hook

② Determine work methods and procedures and inform relevant parties

③ Attaching the hook

○ Sufficient strength ○ Attachment by welding ○ Position that will not cause damage

④ Machine selection

○ Sufficient stability ○ Sufficient capacity

⑤ No entry measures

○ Contact with the machine

○ Machine tipping

○ Falling or tipping of earth retaining components

⑥ Secure connection between the hook and
earth retaining components

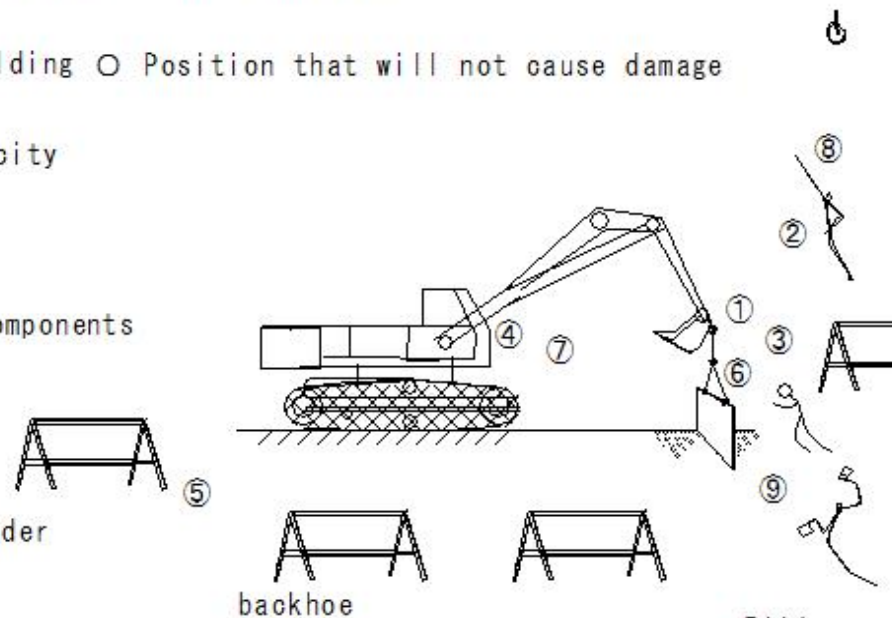
⑦ Inspection before starting work

○ Check for abnormalities

⑧ Designate and directly direct the work leader

⑨ Establish signals

○ Designate signal person

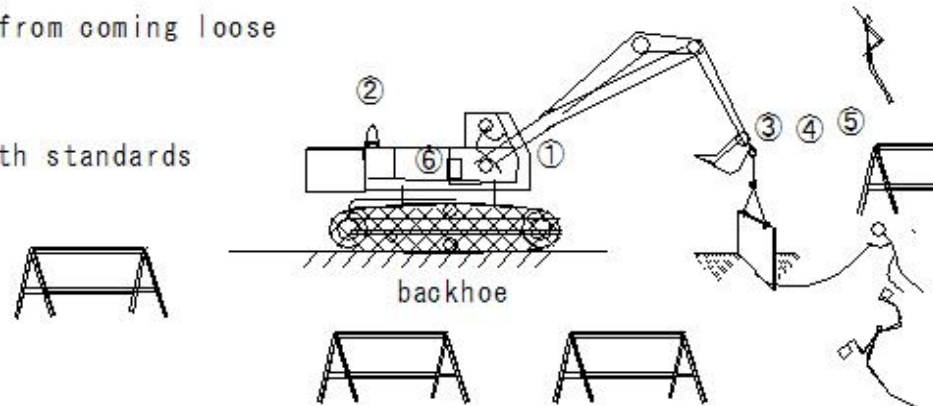


(S551) Backhoe with crane function

(S551) Backhoe with crane function

Backhoe with crane function

- ① Load meter
Load display monitor in the driver's seat
- ② Crane mode
External indicator light
Orange
- ③ Retractable lifting hook
Many models are designed to allow the hook to be retracted when not in crane operation
- ④ The hook is stored in the bucket link
- ⑤ The hook has a device to prevent it from coming loose
- ⑥ Display, etc.
 - Rated load nameplate
 - Nameplate indicating compliance with standards
 - Rated load table



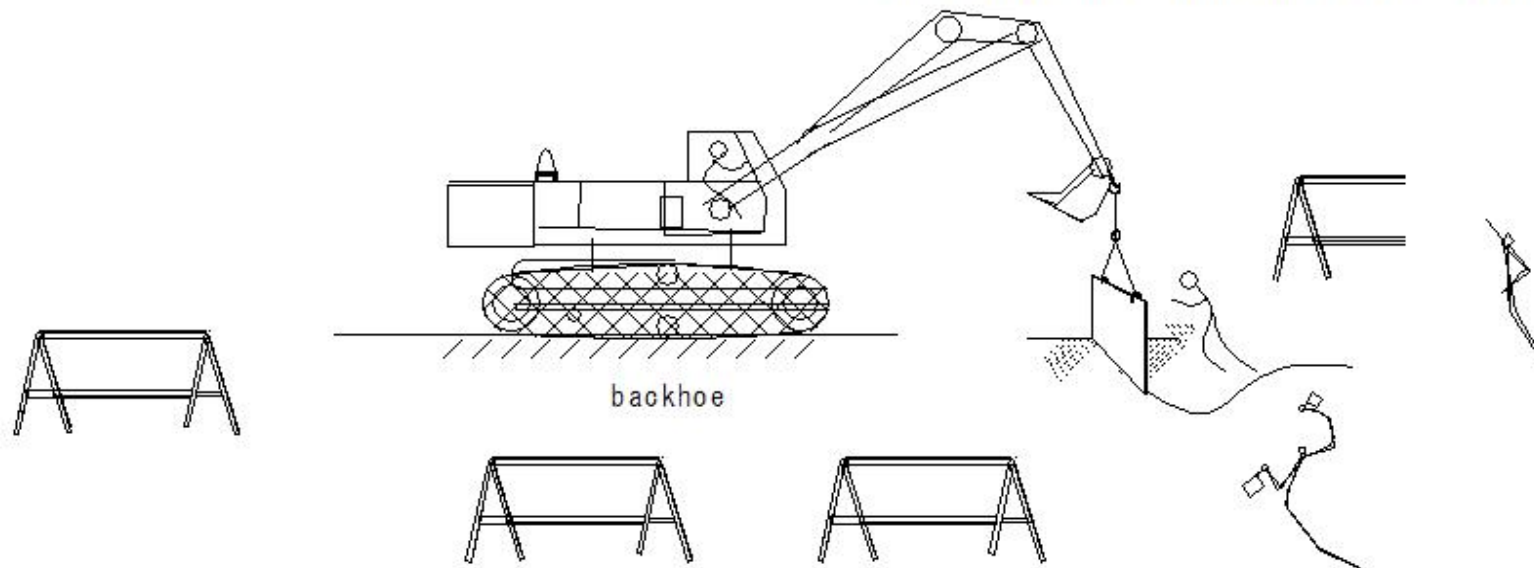
(S552)Backhoe with crane function

(S552)Backhoe with crane function

Backhoe with crane function

Required qualifications

Rigging work: Qualified person for rigging



(S553)Compaction machines (rollers)

(S553) Compaction machines (rollers)

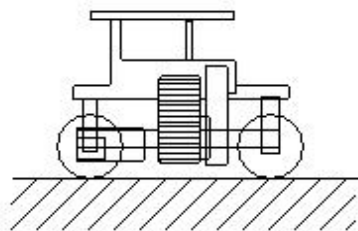
Safe operation of compaction machines (rollers)

Precautions when using compaction machines (rollers)

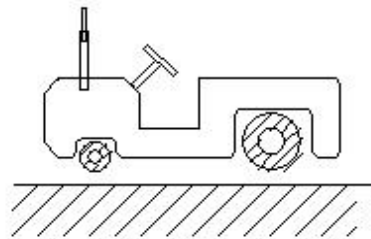
① The vehicle is heavy

High-speed driving, sudden starts, sudden stops, sharp turns----tipping, falling---

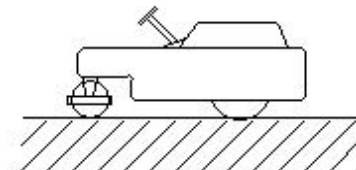
Do not drive roughly



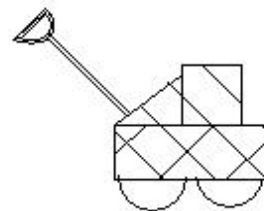
Road roller



Tire roller



Vibrating roller



Hand-guided rollers

(S554)Compaction machines (rollers)

(S554) Compaction machines (rollers)

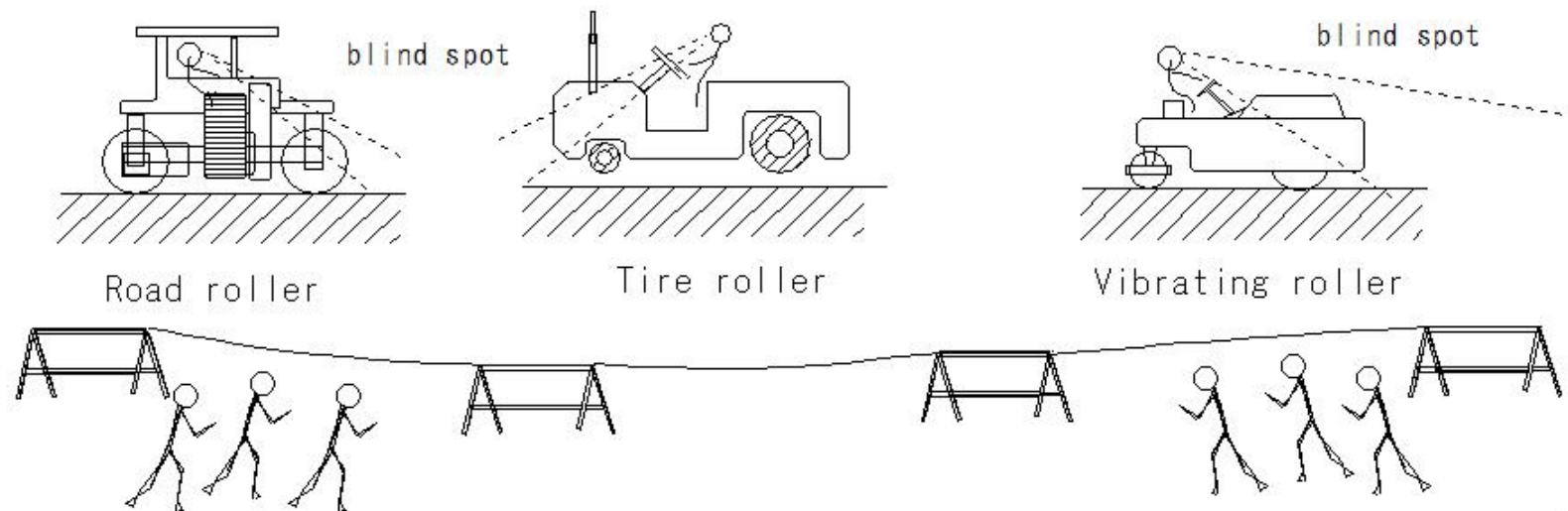
Safe operation of compaction machines (rollers)

Precautions when using compaction machines (rollers)

② The blind spot is wide

The driver has difficulty seeing the surroundings

Do not let workers get close



M136

(S555)Compaction machines (rollers)

(S555) Compaction machines (rollers)

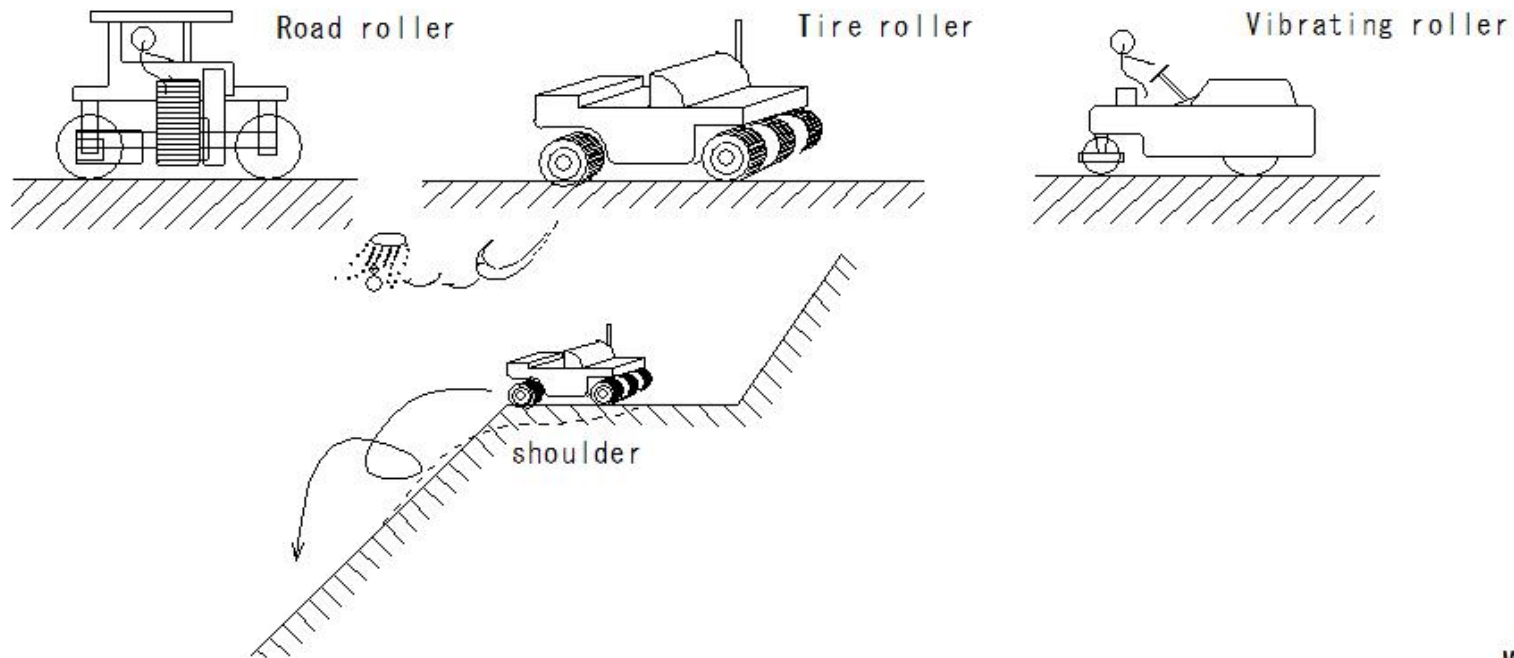
Safe operation of compaction machines (rollers)

Precautions when using compaction machines (rollers)

- ③ Do not get too close in case of compacting the road shoulder

Perform compaction work with care, especially after rainfall

Vibration rollers tend to drift to the lower side



(S556)Compaction machines (rollers)

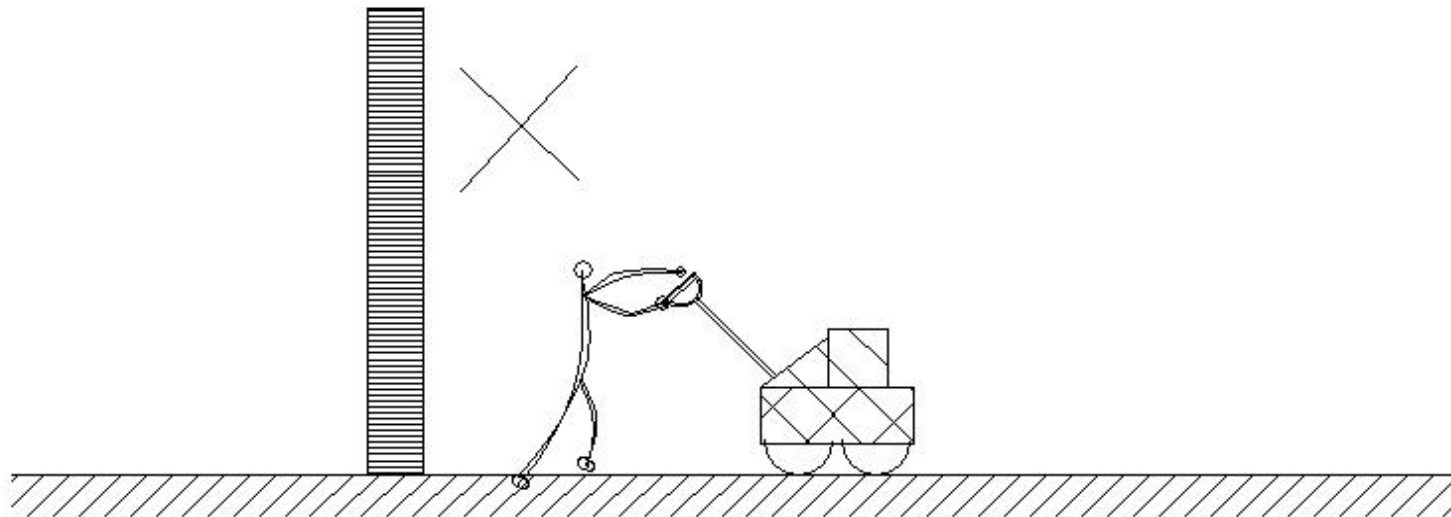
(S556) Compaction machines (rollers)

Safe operation of compaction machines (rollers)

Precautions when using compaction machines (rollers)

- ④ In case of reversing with hand-guided rollers, there is a risk of being pinched
between the rear obstacle and the operating handle

Do not operate immediately after the operating handle



Hand-guided rollers

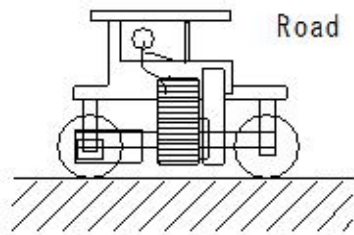
(S557)Compaction machines (rollers)

(S557)Compaction machines (rollers)

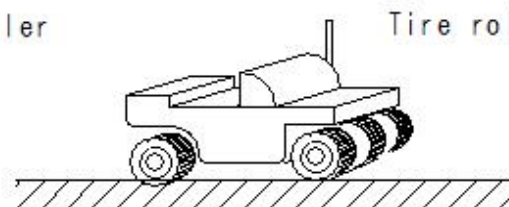
Safe operation of compaction machines (rollers)

Precautions when using compaction machines (rollers)

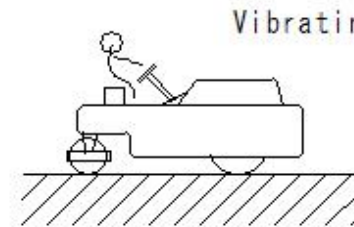
- ⑤ The surface of the roller and tires is smooth and slippery



Road roller

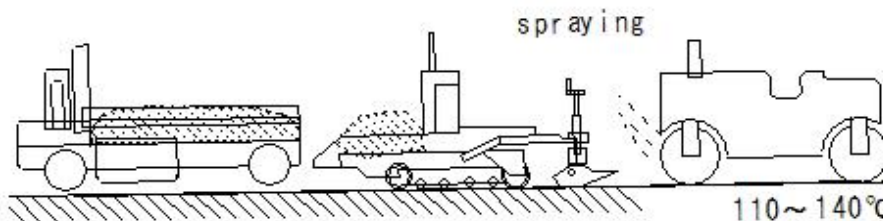


Tire roller



Vibrating roller

slippery



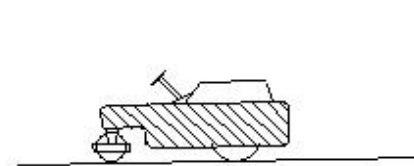
spraying

asphalt finisher

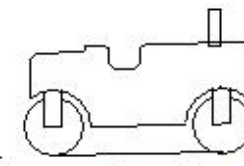
road roller

110~140℃

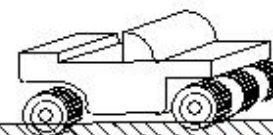
End Temperature 70-90℃



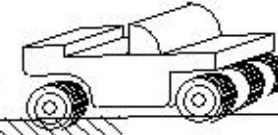
Vibration roller



road roller



Tire roller



Tire roller

H63

M136

(S558)Compaction machines (rollers)

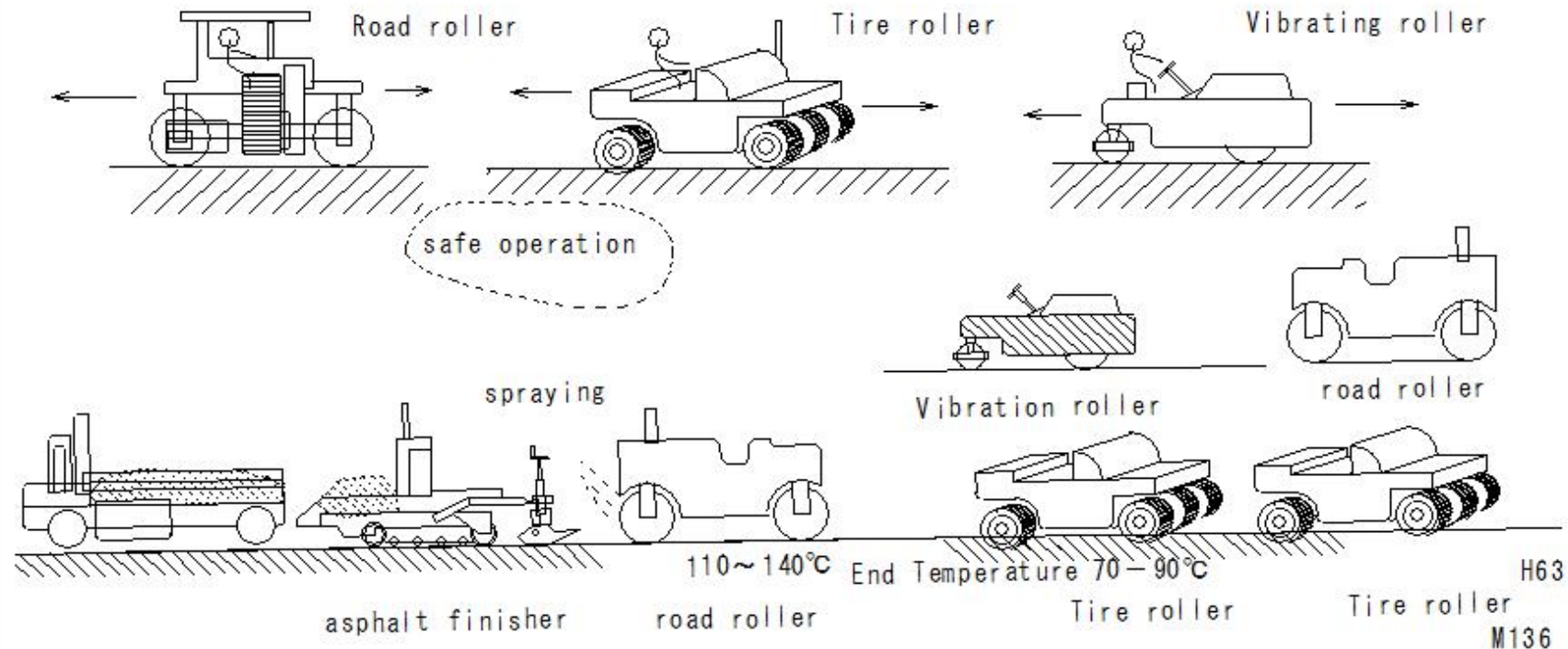
(S558) Compaction machines (rollers)

Safe operation of compaction machines (rollers)

Precautions in case of using compaction machines (rollers)

⑥ Compaction work involves repeated forward and backward movements

Drive at a speed that allows safe operation



(S559)Compaction machines (rollers)

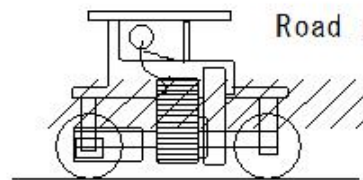
(S559) Compaction machines (rollers)

Safe operation of compaction machines (rollers)

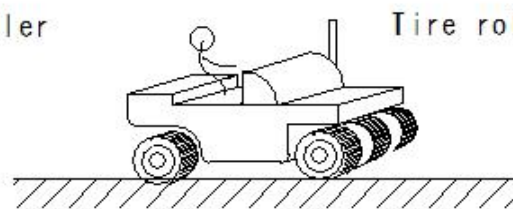
Precautions in case of using compaction machines (rollers)

Types of rollers Road roller: Macadam roller Tire roller Hand-guided roller

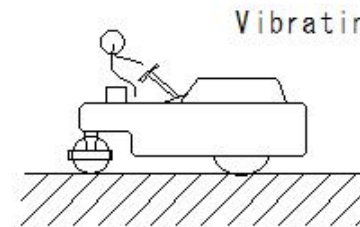
Vibration rollers tend to drift to the lower side



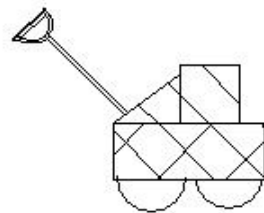
Road roller



Tire roller

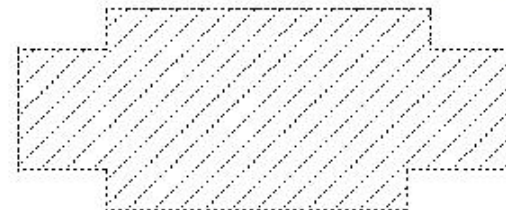


Vibrating roller



Hand-guided rollers

Examples of blind spots for vibrating rollers



(S560)Concrete Pump

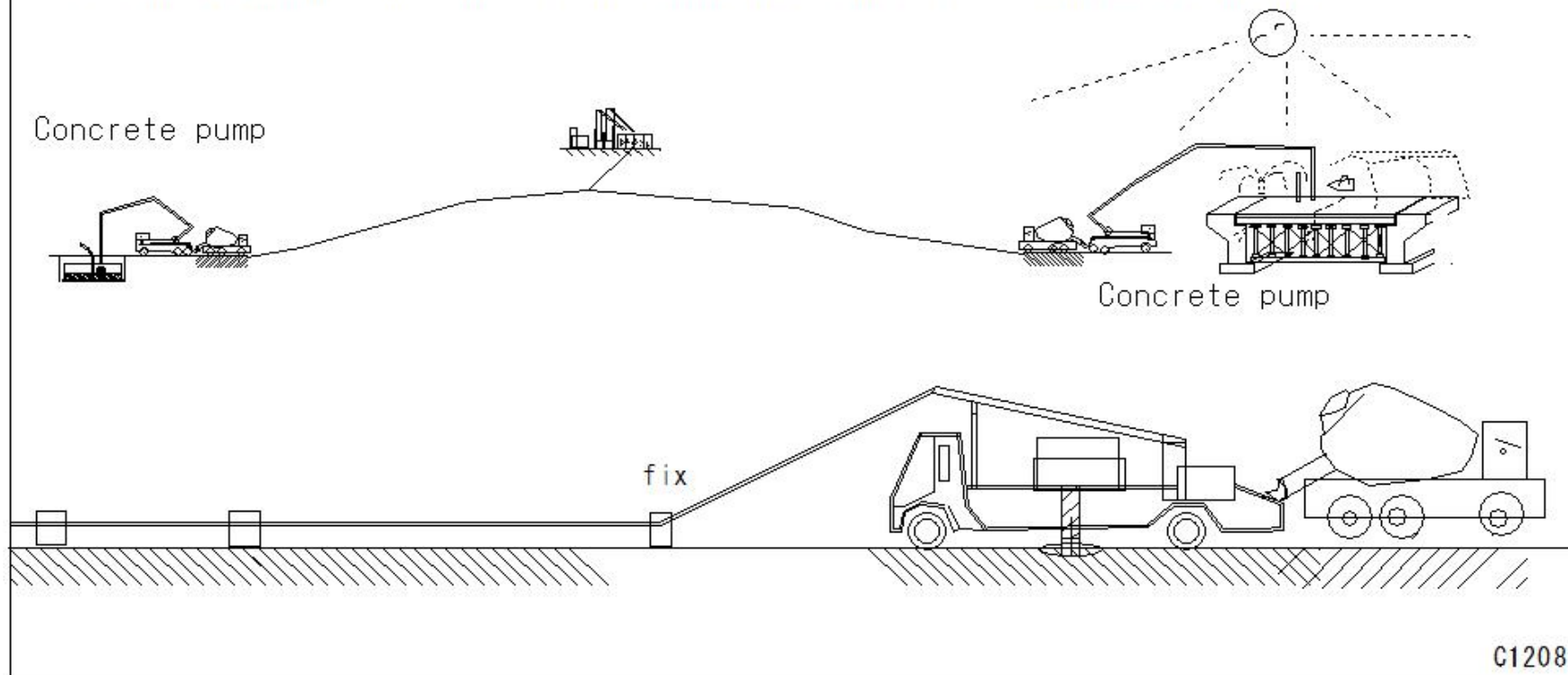
(S560) Concrete Pump

Safe operation of concrete pump vehicles, etc.

Concrete pump vehicles

Prevention of falling off and shaking of transport pipes, etc.

- ① Securely connect the transport pipe using joints and fix it to a solid structure



(S561)Concrete Pump

(S561)Concrete Pump

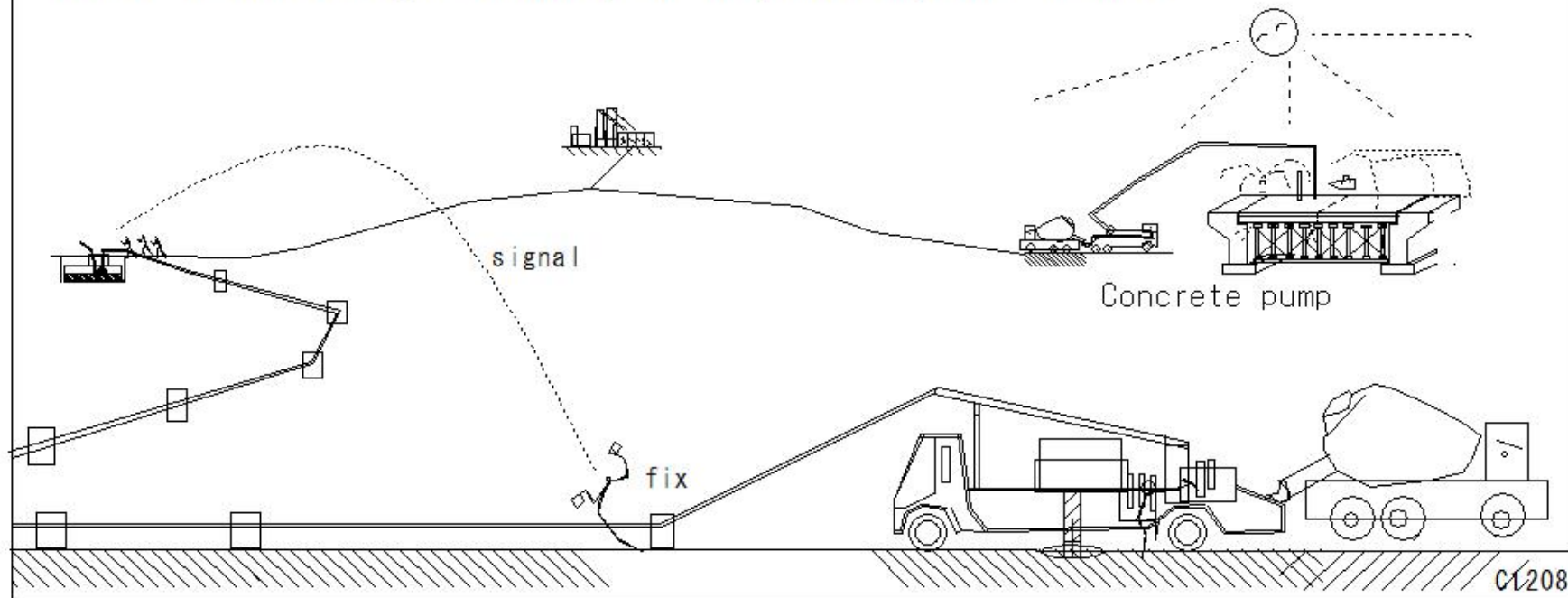
Safe operation of concrete pump vehicles, etc.

Concrete pump vehicles

Prevention of falling off and shaking of transport pipes, etc.

- ② Install a communication device between the person performing the work and the person holding the end of the hose

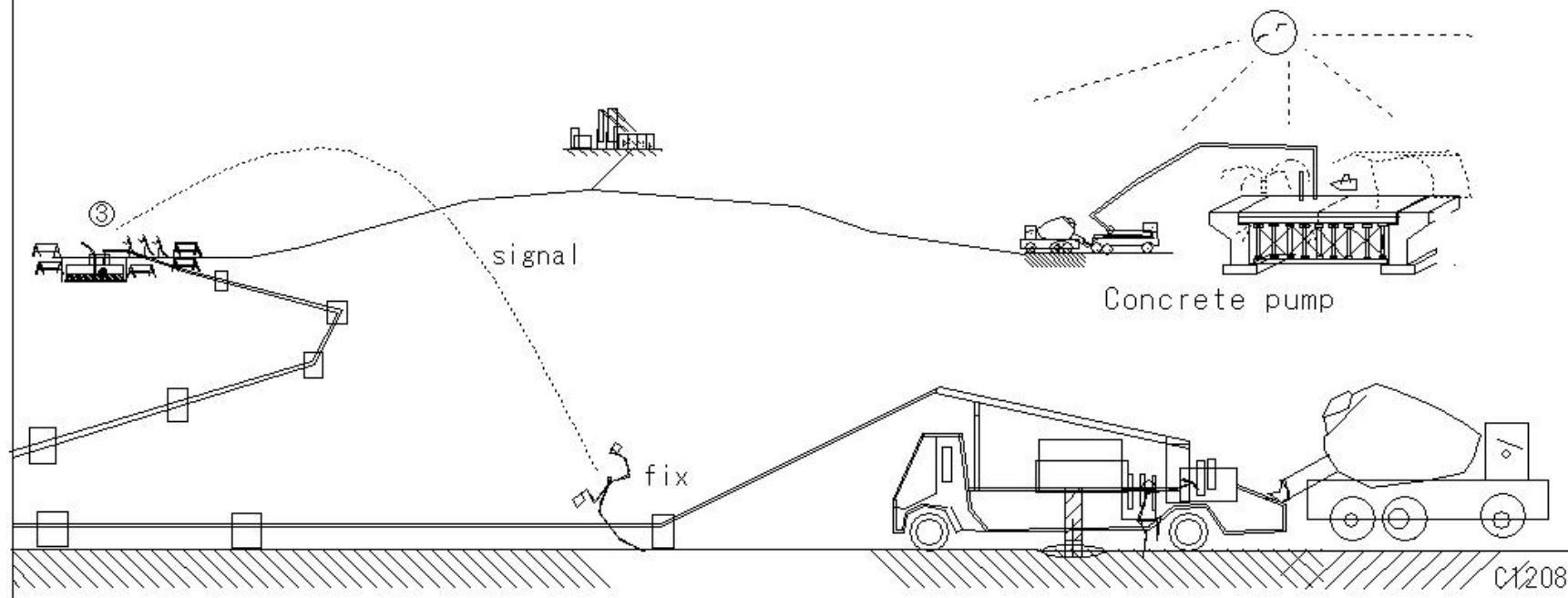
Establish a certain signal and designate that person to perform the work



(S562) Concrete Pump

Concrete pump vehicles

③ Do not enter dangerous areas due to blowouts



(S563)Concrete Pump

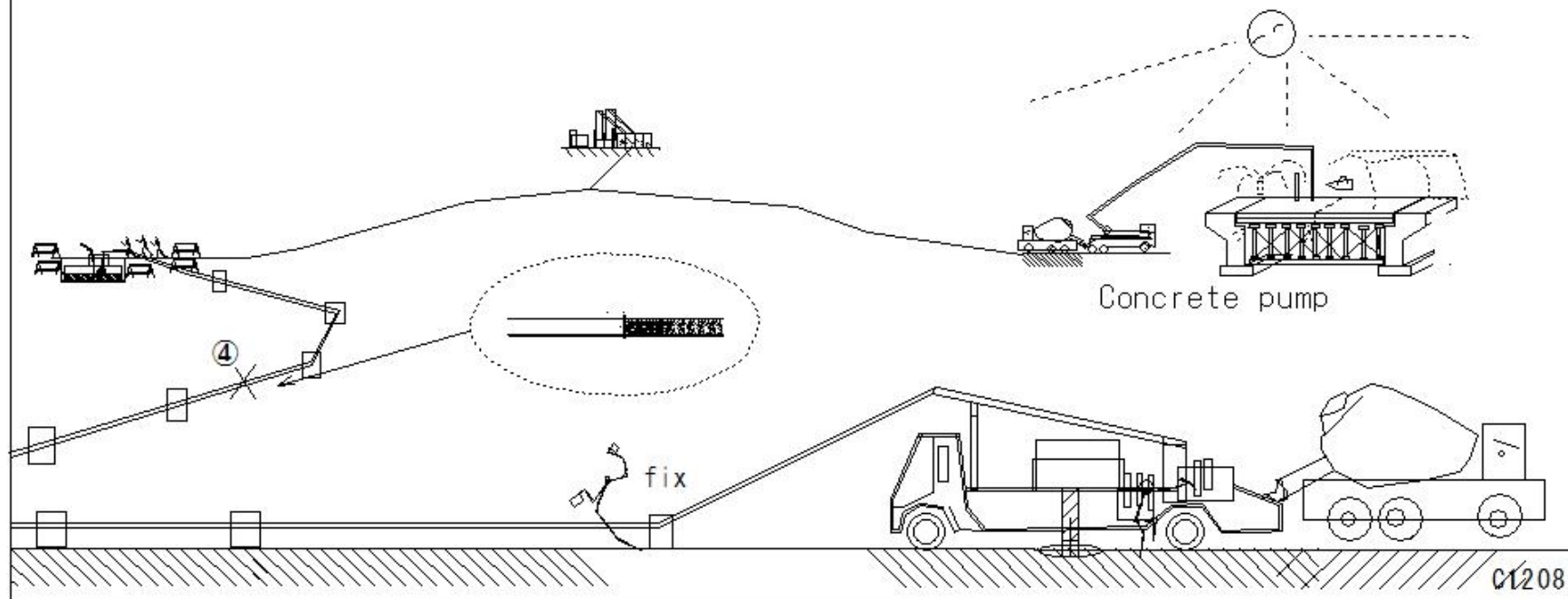
(S563)Concrete Pump

Safe operation of concrete pump vehicles, etc.

Concrete pump vehicles

Prevention of falling off and shaking of transport pipes, etc.

- ④ In case of disconnecting a blocked transport pipe connection, reduce the internal pressure and take measures to prevent concrete, etc. from blowing out



(S564)Concrete Pump

(S564) Concrete Pump

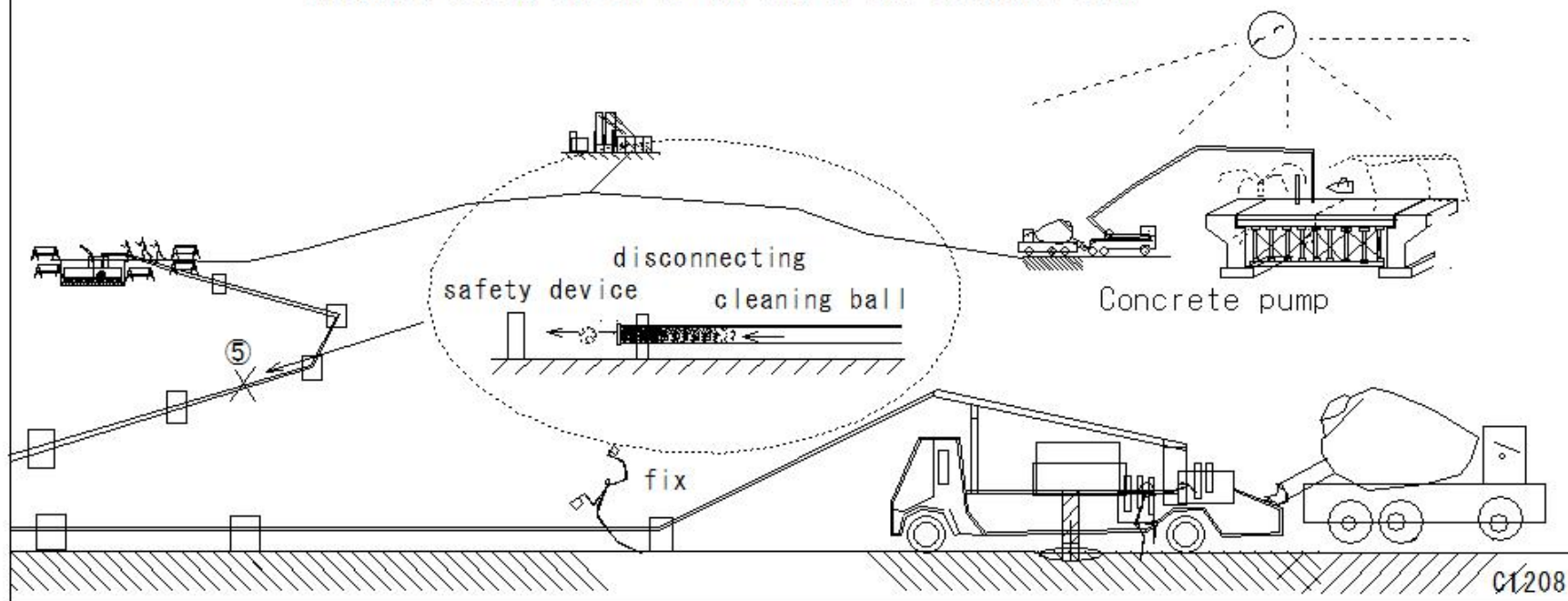
Safe operation of concrete pump vehicles, etc.

Concrete pump vehicles

Prevention of falling off and shaking of transport pipes, etc.

In case of disconnecting a blocked transport pipe connection,

- ⑤ In case of performing cleaning work using a cleaning ball,
attach a safety device to the end of the transport pipe



(S565)Breakers

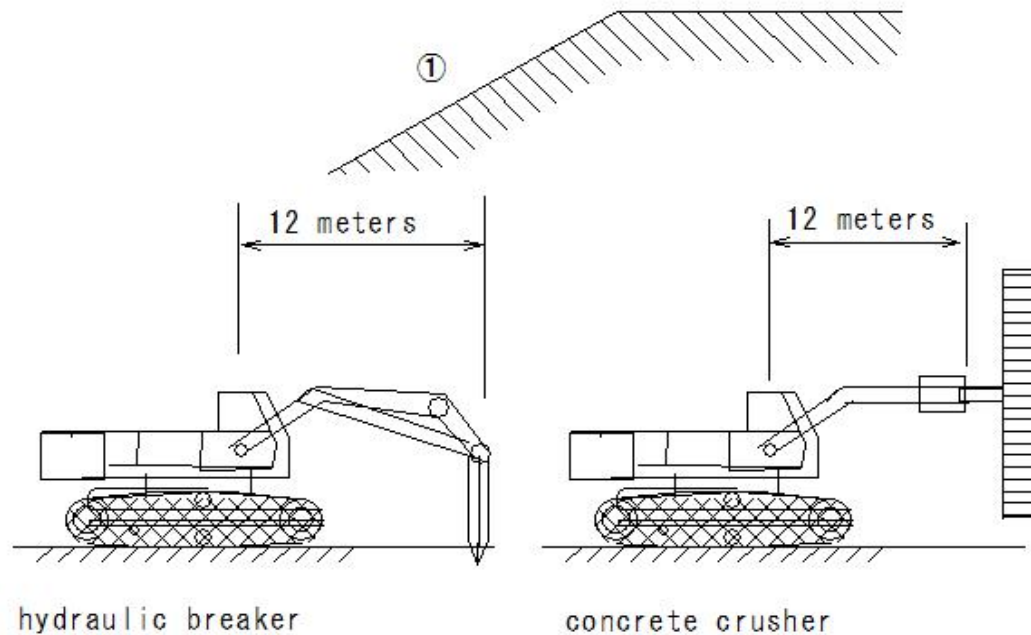
(S565) Breakers

Safe operation of breakers, etc.

Demolition machinery: breakers, steel frame cutting machines, concrete crushers, demolition grabbers

○ Prohibition of use

① Prohibition of use of demolition machinery with booms longer than 12 meters on sloping areas



E290
M139

(S566)Breakers

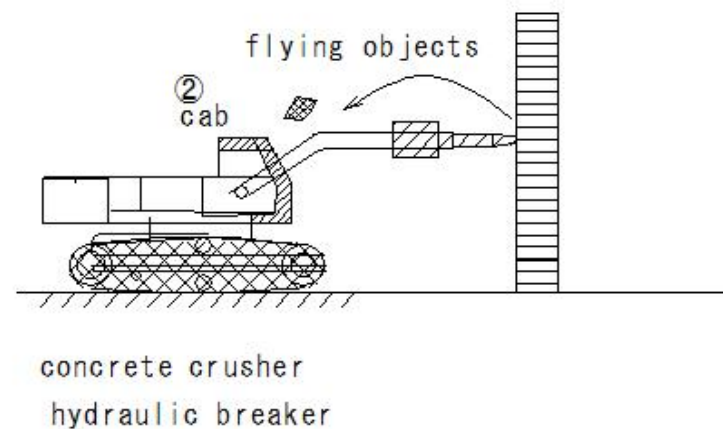
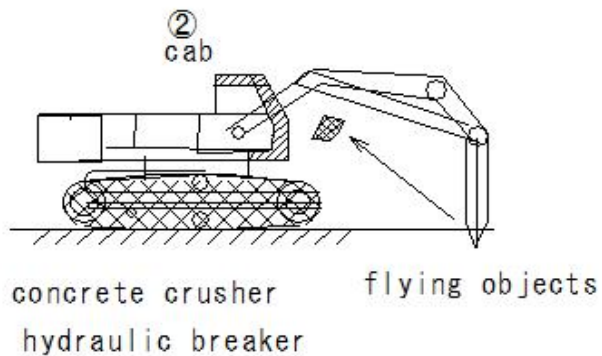
(S566) Breakers

Safe operation of breakers, etc.

Demolition machinery: breakers, steel frame cutting machines, concrete crushers, demolition grabbers

○ Prohibition of use

② Prohibition of use of demolition machinery without a cab in areas
where there is a risk of "flying objects"



E290
M139

(S567) Breakers

(S567) Breakers

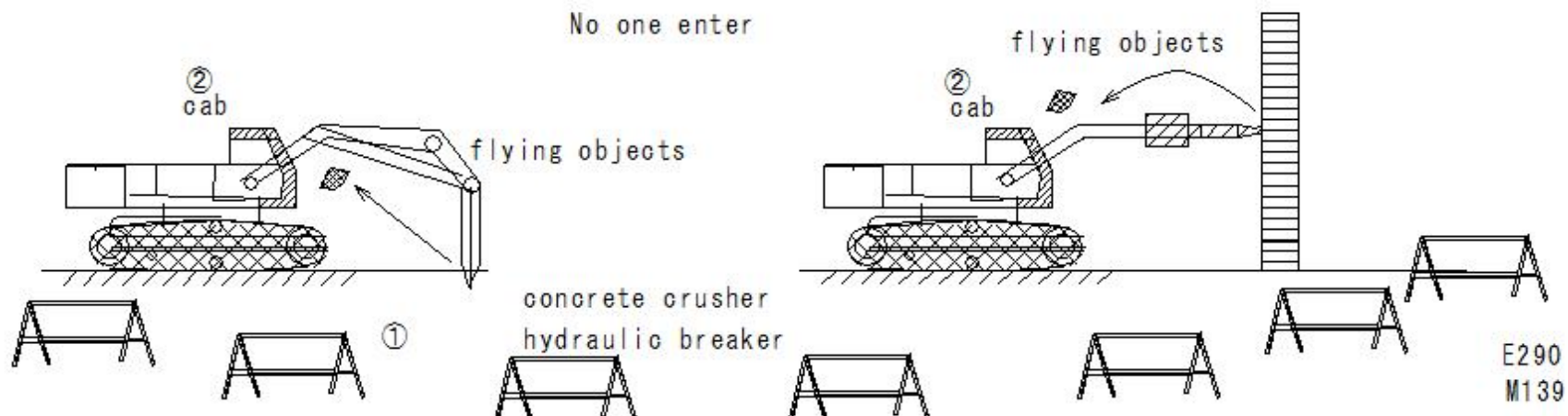
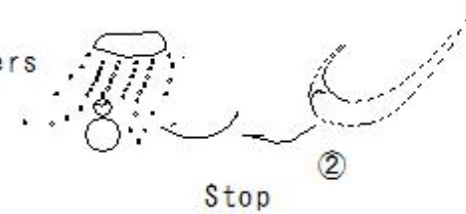
Safe operation of breakers, etc.

Demolition machinery: breakers, steel frame cutting machines, concrete crushers, demolition grabbers

○ Prohibition of use

Work such as dismantling structures

- ①. No one other than the driver is permitted to enter areas
where flying objects could pose a danger to workers
- ②. Work is suspended in bad weather

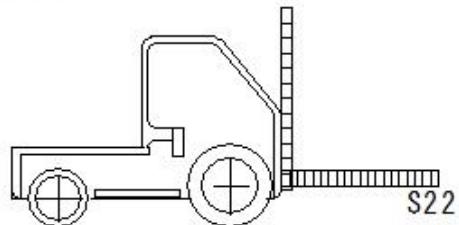


(S568)Loading and Unloading machinery

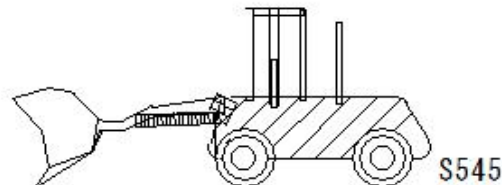
(S568)Loading and Unloading machinery

Safe operation of vehicle-type loading and unloading machinery, etc.

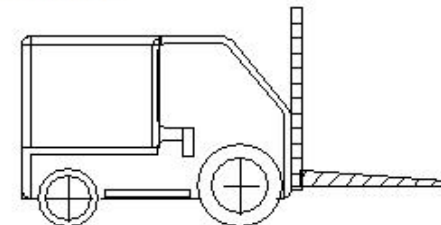
① Forklift



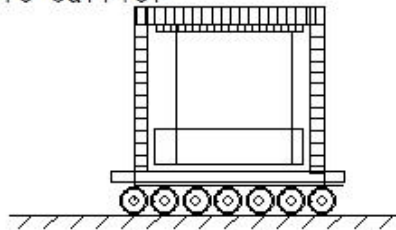
② Shovel loader



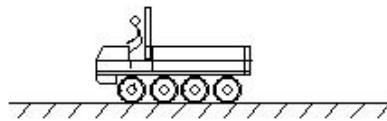
③ Fork loader



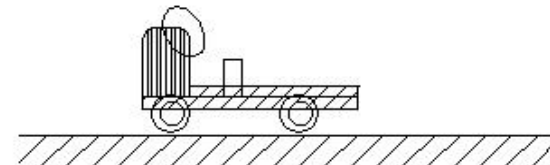
④ Straddle carrier



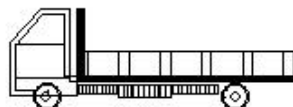
⑤ Off-road transport vehicle



⑥ In-plant transport vehicle



⑦ Freight vehicle



(S569)Loading and Unloading machinery

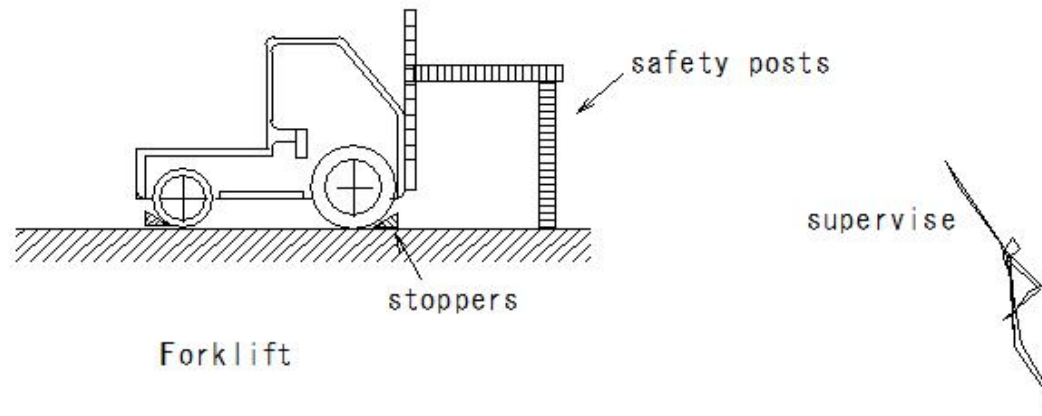
(S569)Loading and Unloading machinery

Safe operation of vehicle-based loading and unloading machinery, etc.

In case of carrying out repairs or attaching/removing attachments

Appointment of a work supervisor

1. Determine the work procedures and directly supervise the work
2. Monitor the use of safety posts, safety blocks, and stoppers



(S570)Loading and Unloading machinery

(S570)Loading and Unloading machinery

Safe operation of vehicle-type loading and unloading machinery, etc.

Appointment of work supervisor

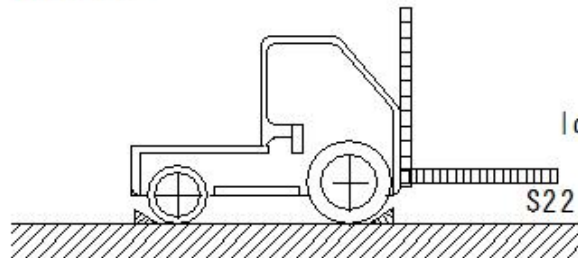
○Driver: Supervise in case of leaving driving position

①Place loading equipment such as forks and shovels in the lowest lowered position

②Stop the engine and ensure brakes are applied

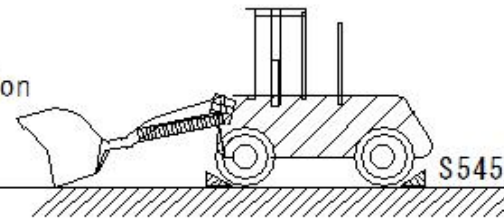
Remove the key

Forklift



Shovel loader

lowered position



Stop the engine

brakes

Remove the key

(S571)Loading and Unloading machinery

(S571)Loading and Unloading machinery

Safe operation of vehicle-type loading and unloading machinery, etc.

Work plan

Make an appropriate work plan

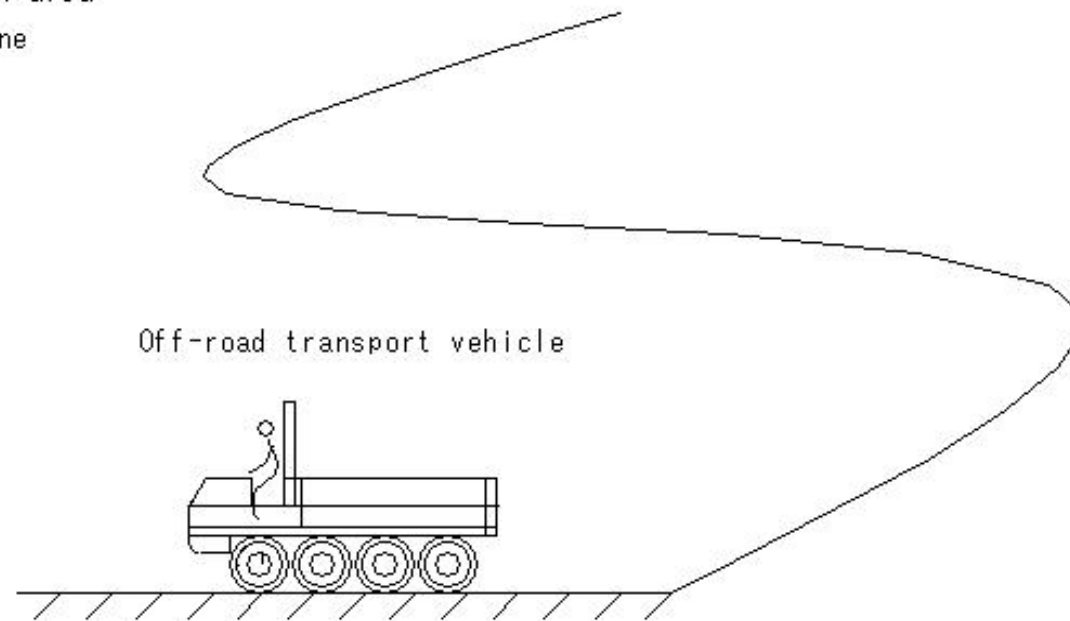
Size and topography of the work area

Type and capacity of the machine

Type and shape of the load

Travel route

Work method is indicated



(S572)Loading and Unloading machinery

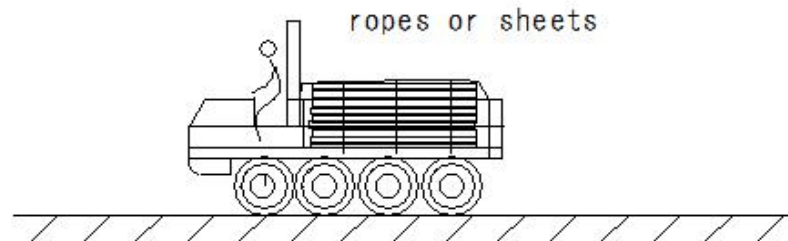
(S572)Loading and Unloading machinery

Safe operation of vehicle-based loading and transporting machinery, etc.

Loading of cargo

- ①. Load so that no overload occurs
- ②. Use ropes or sheets to prevent the cargo from collapsing

Off-road transport vehicle



(S573)Loading and Unloading machinery

(S573)Loading and Unloading machinery

Safe operation of vehicle-based loading and transporting machinery, etc.

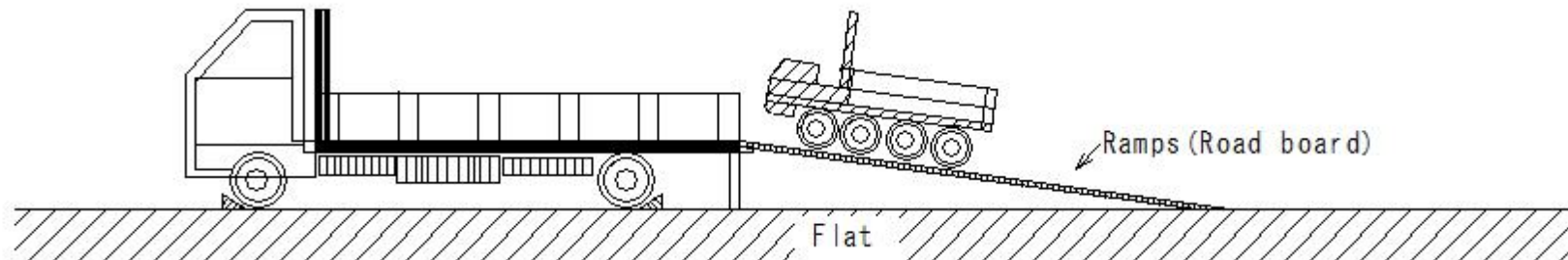
Loading and unloading for transportation

Flat and solid location

Install securely with appropriate gradient

In case of using ramps(Road board), use ones with sufficient length, width and strength

Install securely with appropriate gradient



(S574)Loading and Unloading machinery

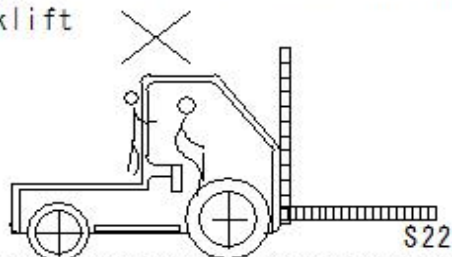
(S574)Loading and Unloading machinery

Safe operation of vehicle-mounted loading and transporting machinery, etc.

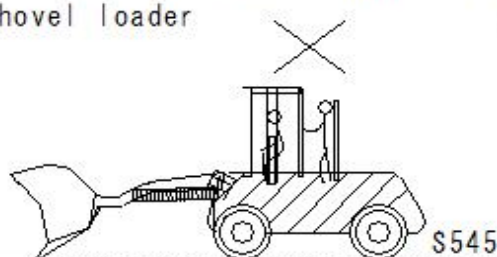
Boarding restrictions

Do not allow people to ride anywhere other than the passenger seat

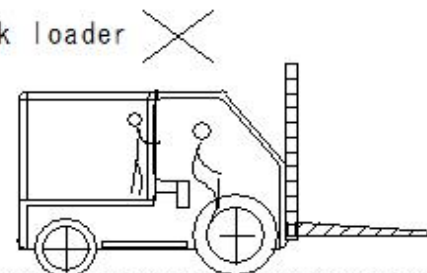
① Forklift



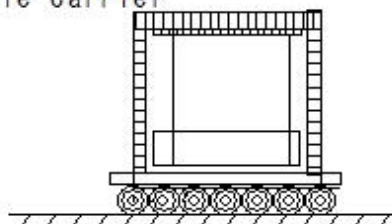
② Shovel loader



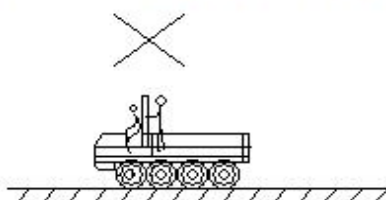
③ Fork loader



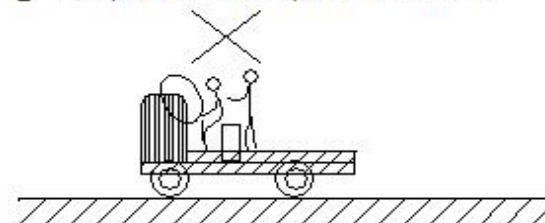
④ Straddle carrier



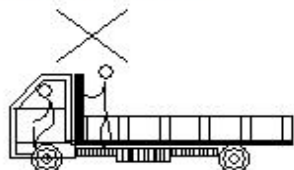
⑤ Off-road transport vehicle



⑥ In-plant transport vehicle



⑦ Freight vehicle



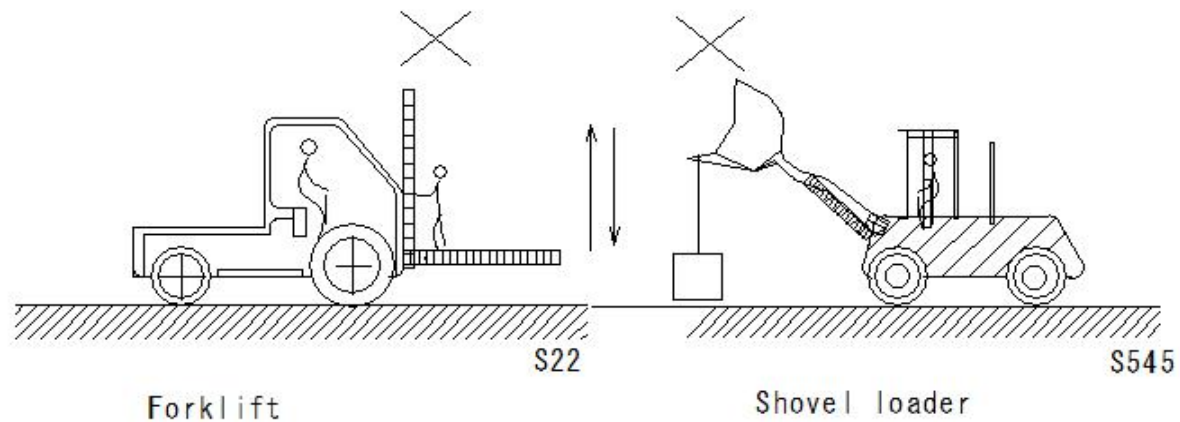
(S575)Loading and Unloading machinery

(S575)Loading and Unloading machinery

Safe operation of vehicle-mounted loading and transporting machinery, etc.

Restrictions on use other than the primary purpose

Do not use for purposes other than the primary purpose, such as lifting loads or lifting people



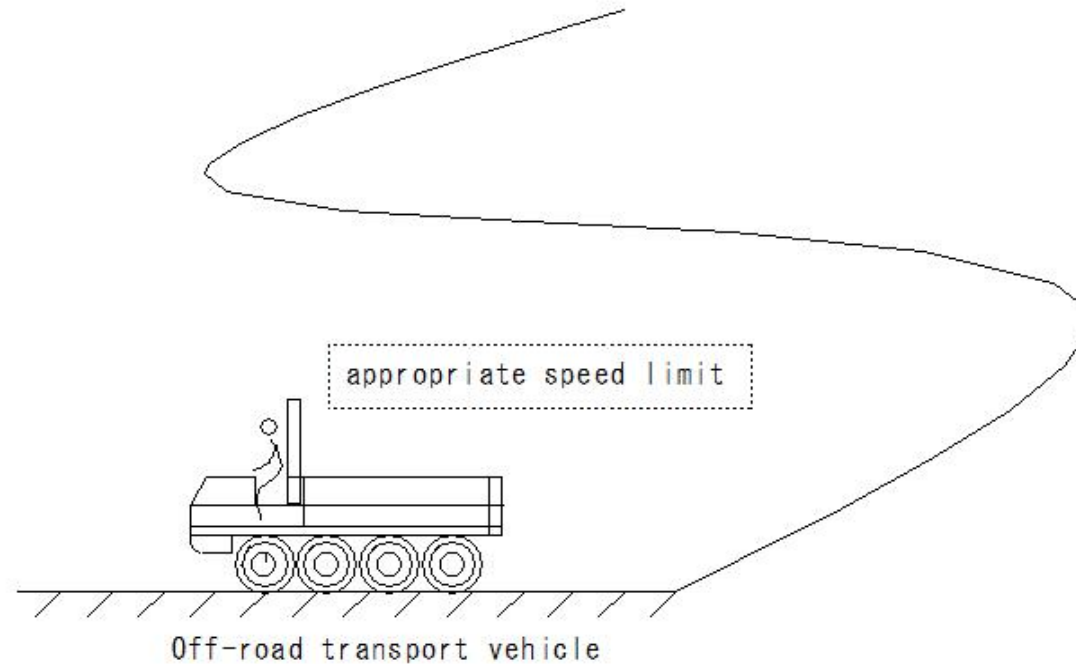
(S576)Loading and Unloading machinery

(S576)Loading and Unloading machinery

Safe operation of vehicle-mounted loading and transporting machinery, etc.

Speed limit

Set an appropriate speed limit according to the terrain, ground conditions, etc.
and operate within it.



(S577)Loading and Unloading machinery

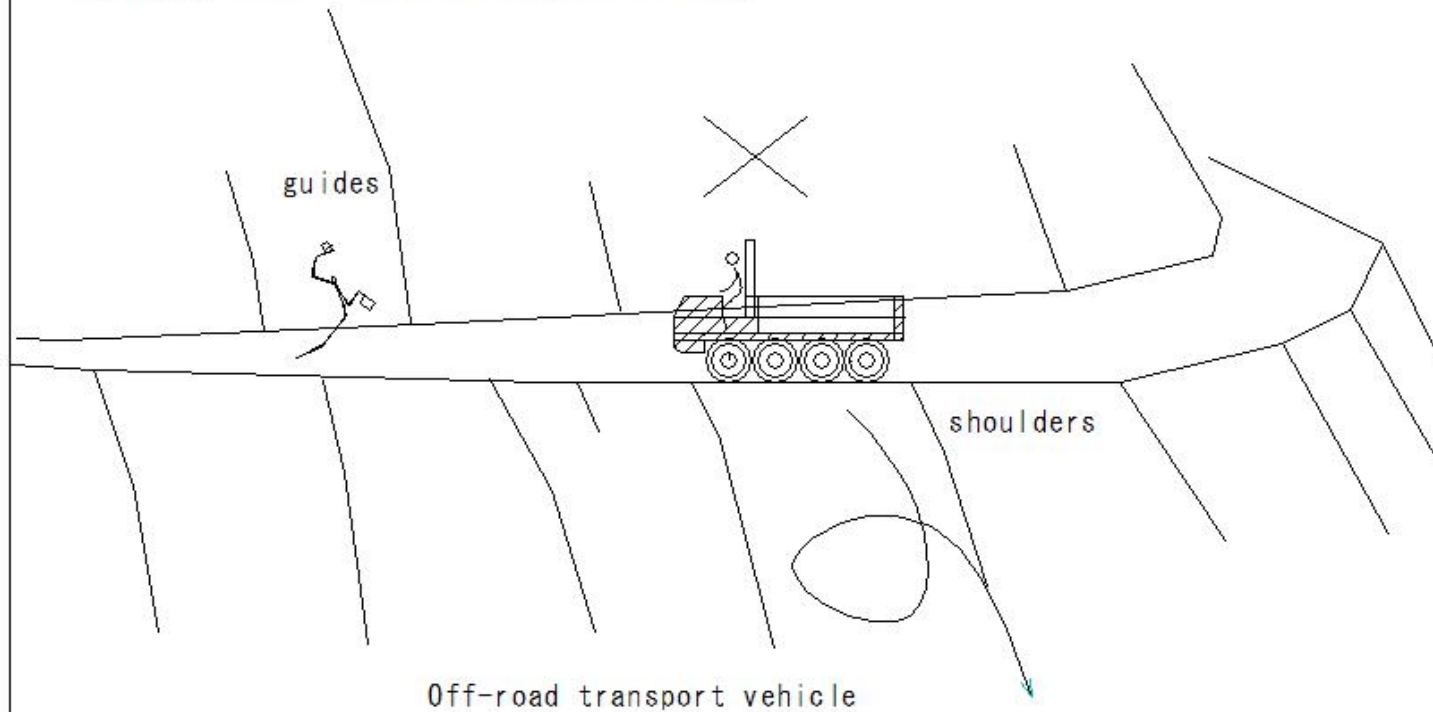
(S577)Loading and Unloading machinery

Safe operation of vehicle-mounted loading and transporting machinery, etc.

Prevention of falls, etc.

Route width, measures to prevent sudden subsidence and collapse of road shoulders

Deploy guides in case of danger is likely



(S578)Loading and Unloading machinery

(S578)Loading and Unloading machinery

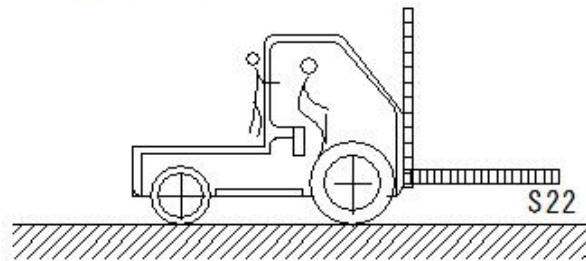
Safe operation of vehicle-mounted loading and transporting machinery, etc.

Prevention of contact

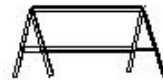
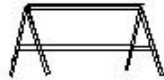
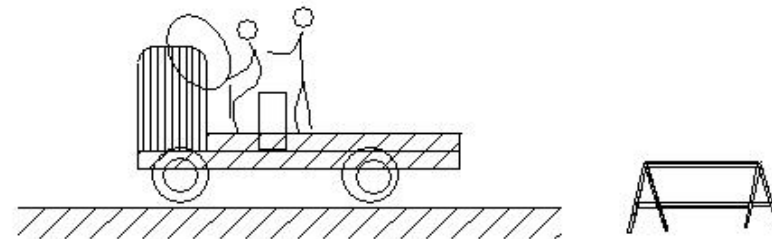
Do not enter areas that come into contact with machinery or loads

Deployment of guides

① Forklift



⑥ In-plant transport vehicle



(S579)Loading and Unloading machinery

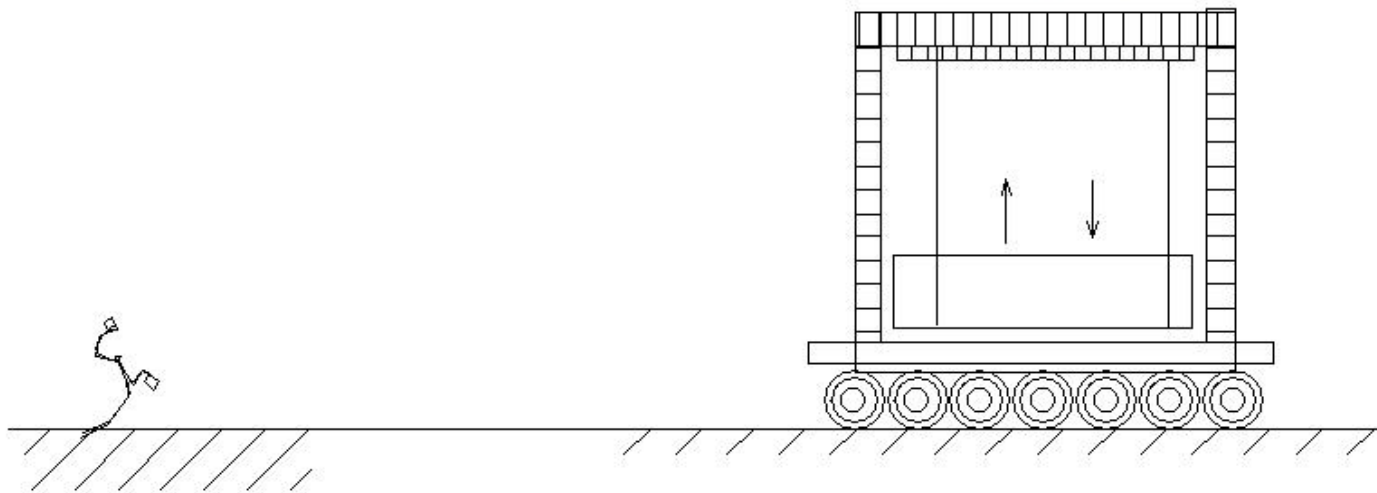
(S579)Loading and Unloading machinery

Safe operation of vehicle-mounted loading and transporting machinery, etc.

Signals

In case of appointing guides, set specific signals to use when working

④ Straddle carrier



(S580)Loading and Unloading machinery

(S580)Loading and Unloading machinery

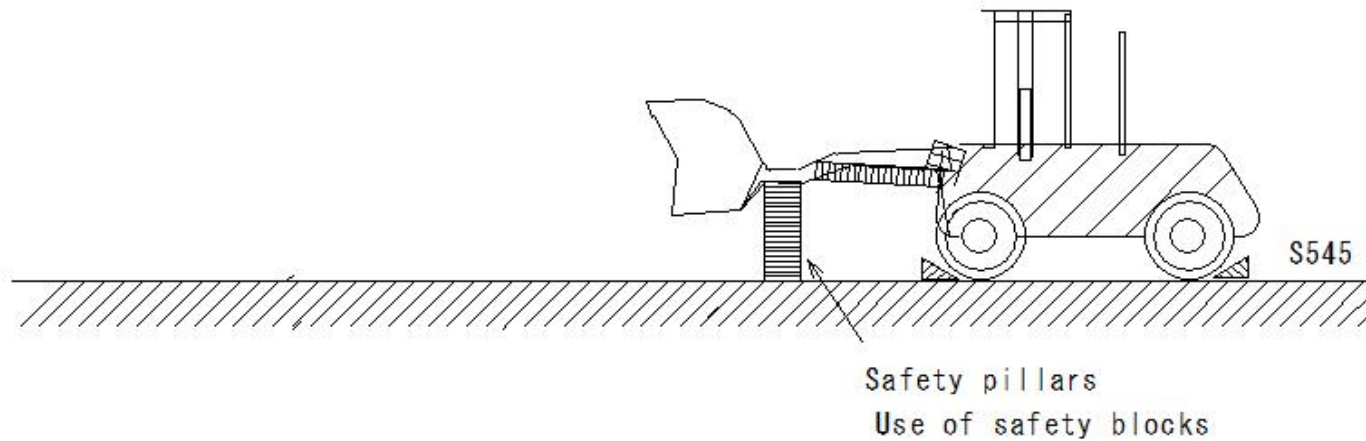
Safe operation of vehicle-mounted loading and transporting machinery, etc.

No entry measures

Fork shovel

Do not enter under the arm, etc.

Shovel loader



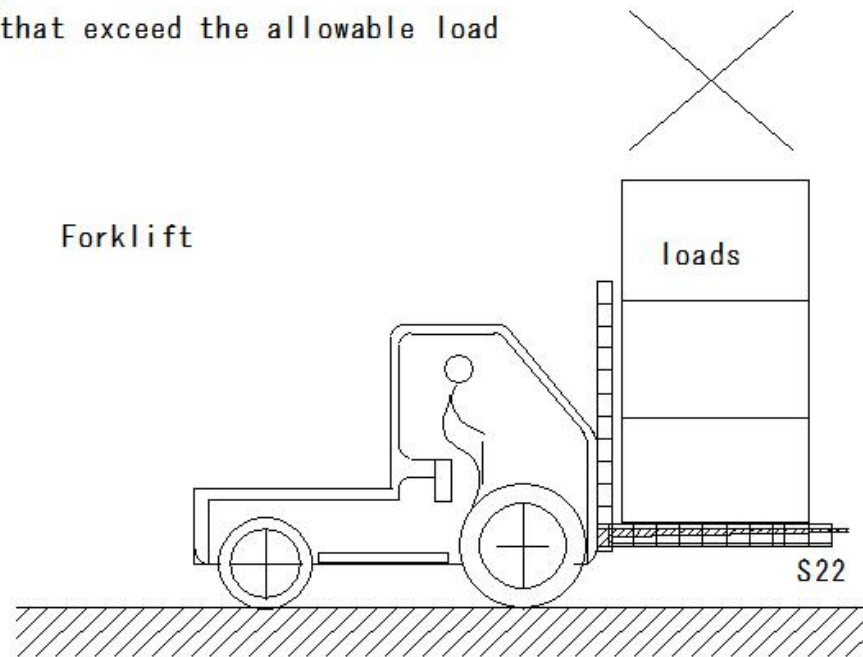
(S581)Forklift

(S581)Forklift

Forklift safety work

Restrictions on use

Do not load loads that exceed the allowable load



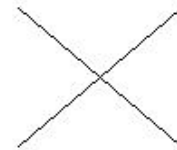
(S582)Forklift

(S582)Forklift

Forklift safety work

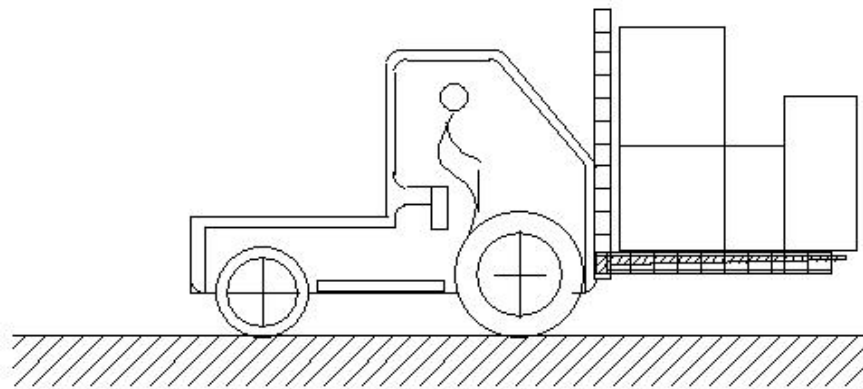
Loading

Load so that uneven loads do not occur



Forklift

uneven loads



S22

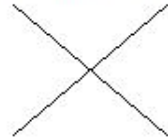
(S583)Forklift

(S583) Forklift

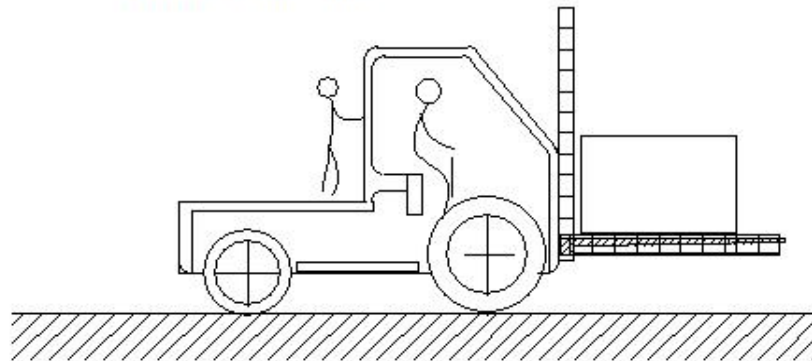
Forklift safety work

Riding restrictions

Do not allow workers to ride anywhere other than the passenger seat



workers to ride



Forklift

S22

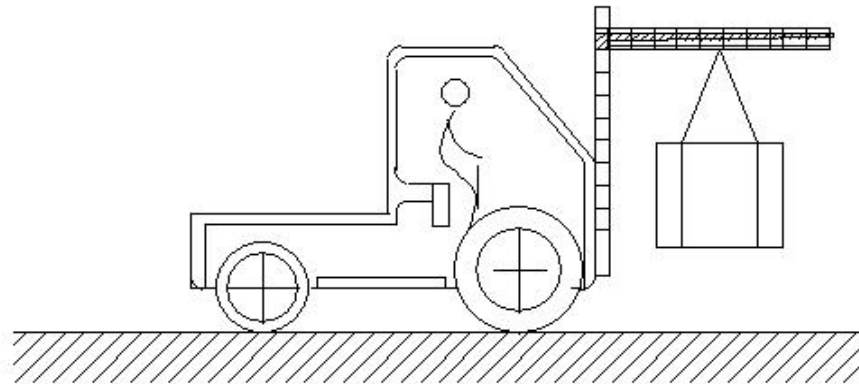
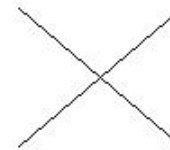
(S584)Forklift

(S584) Forklift

Forklift safety work

Forklift safety work

Restrictions on use other than the main purpose



Forklift

S22

(S585)Forklift

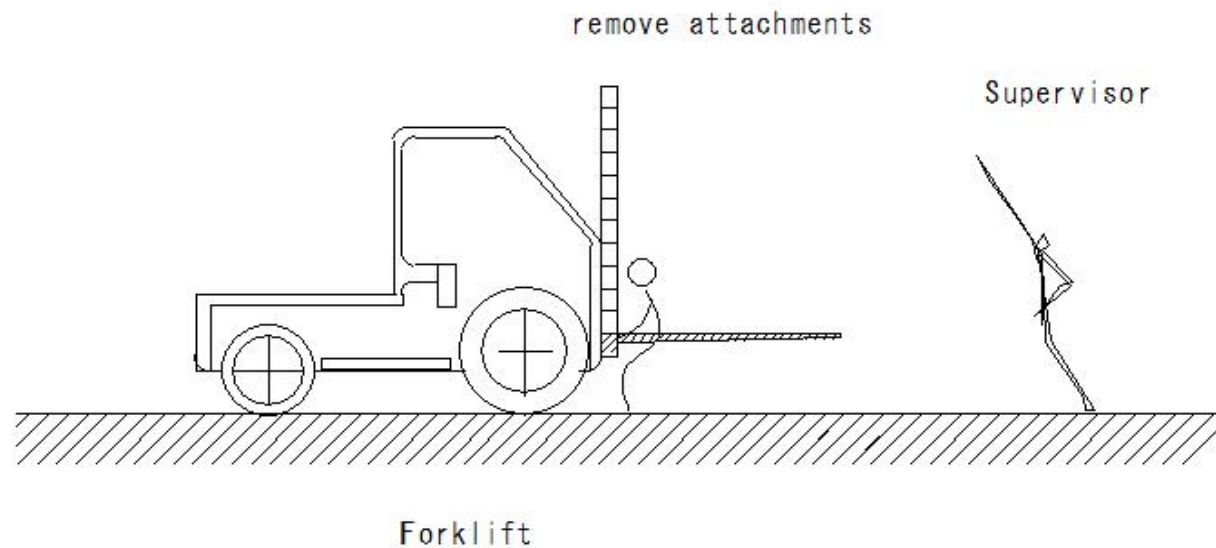
(S585) Forklift

Forklift safety work

Appointment: Work supervisor

Repairs or work to install or remove attachments

must be performed under the direct supervision of a work supervisor



S22

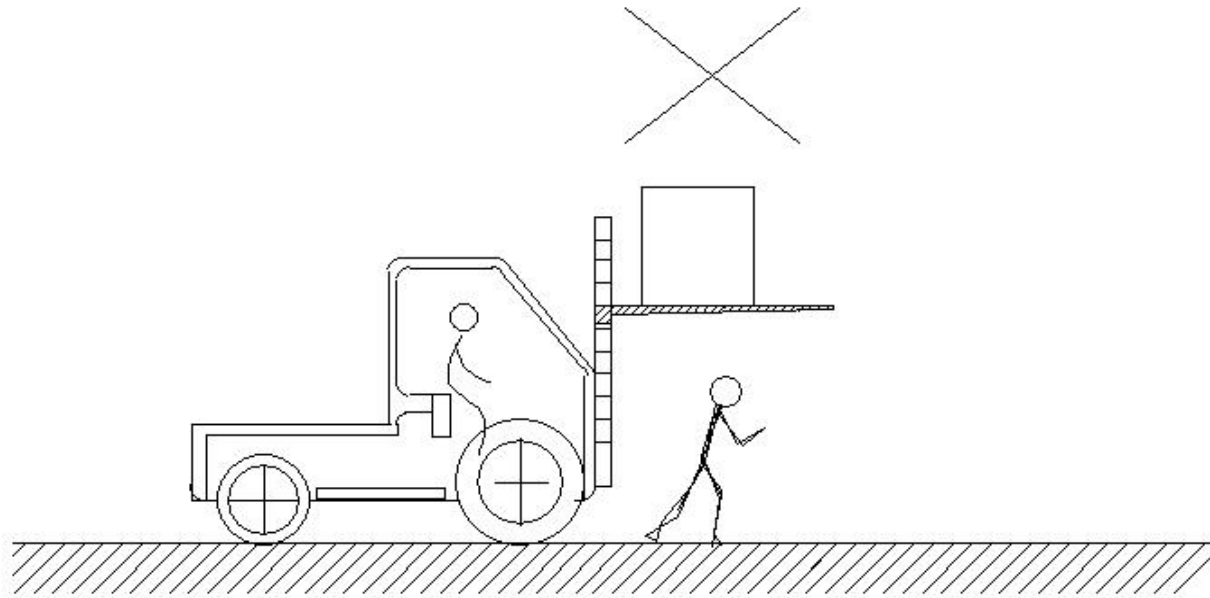
(S586)Forklift

(S586)Forklift

Forklift safety work

No entry

Prohibition on entry under loads supported by forklifts, etc.



Forklift

(S587)Forklift

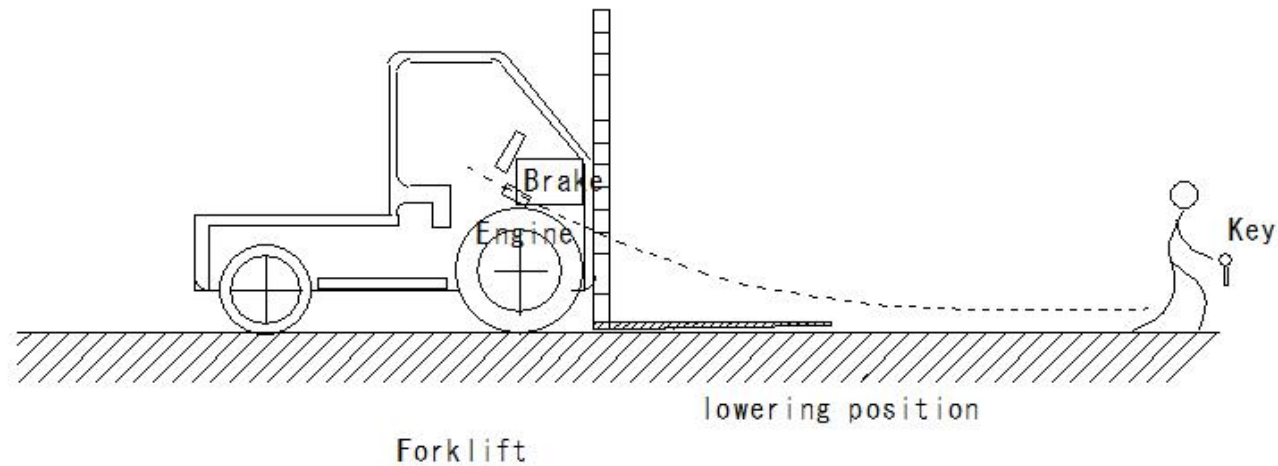
(S587)Forklift

Forklift safety work

Measures to take when leaving the driving position

Place the forks in the lowest lowering position

Stop the engine, ensure that the brakes are applied, and remove the key



(S588)Forklift

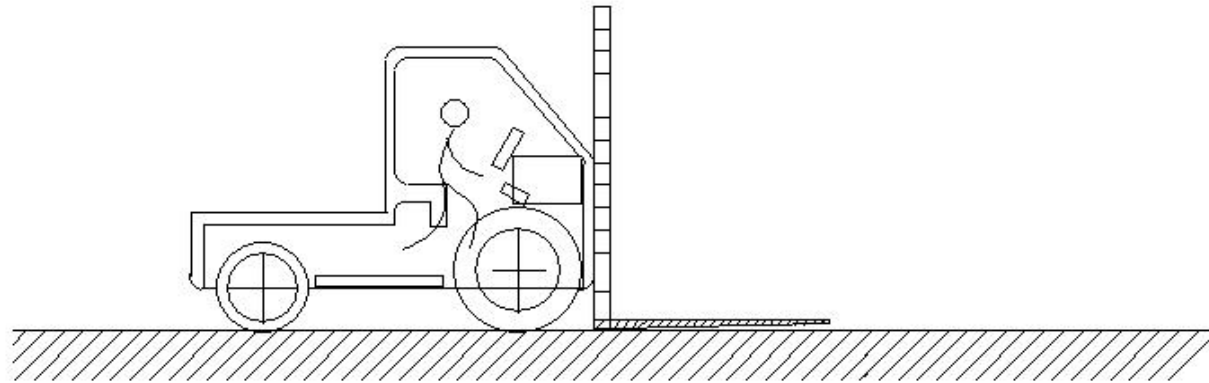
(S588)Forklift

Forklift safety work

Driver qualifications

Completion of skills training

Completion of special training



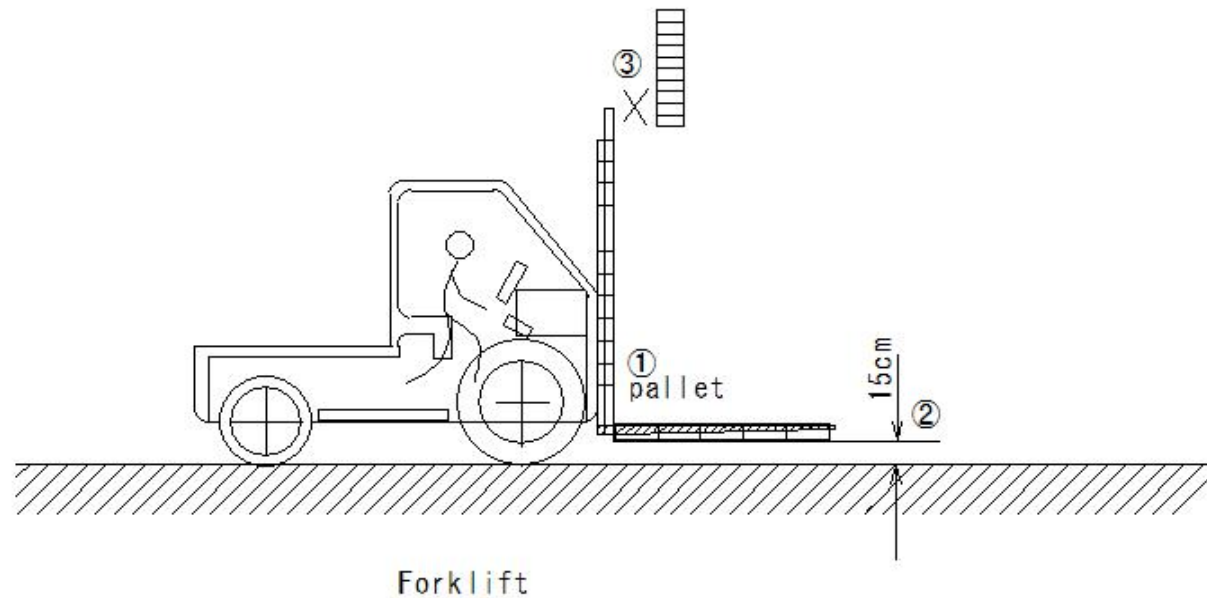
Forklift

(S589)Forklift

(S589)Forklift

Forklift safety

- ① Insert the forks all the way into the pallet, etc.
- ② In case of driving, raise the forks about 15cm above the ground
- ③ In case of driving, be careful of obstacles (top of the mast, etc.)



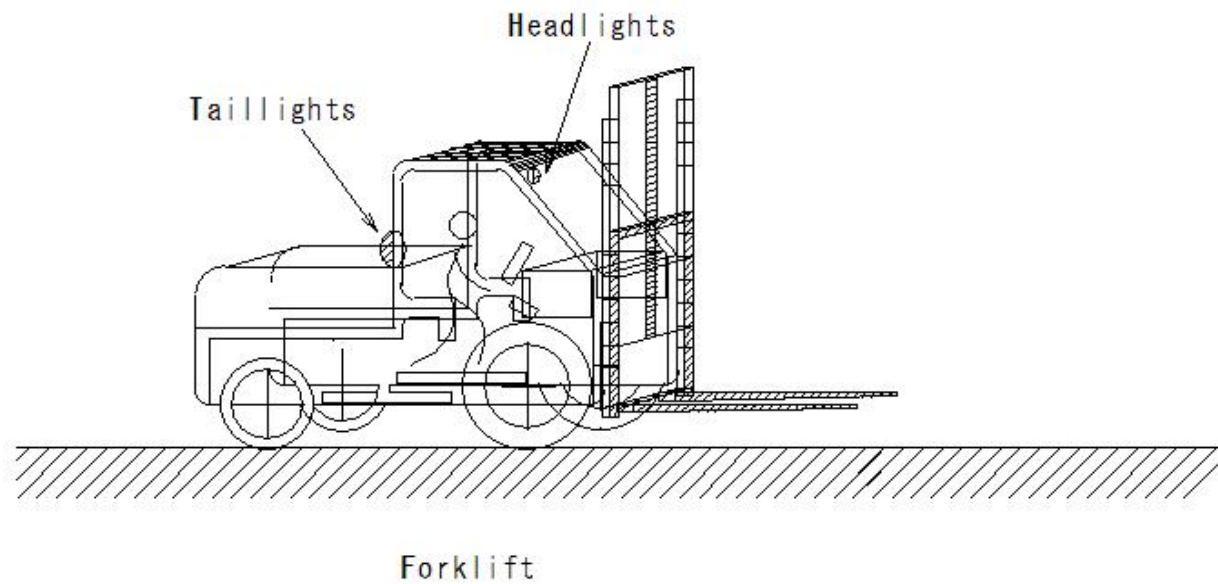
(S590)Forklift

(S590)Forklift

Structural management of forklifts

Headlights and taillights

Equipped with headlights and taillights



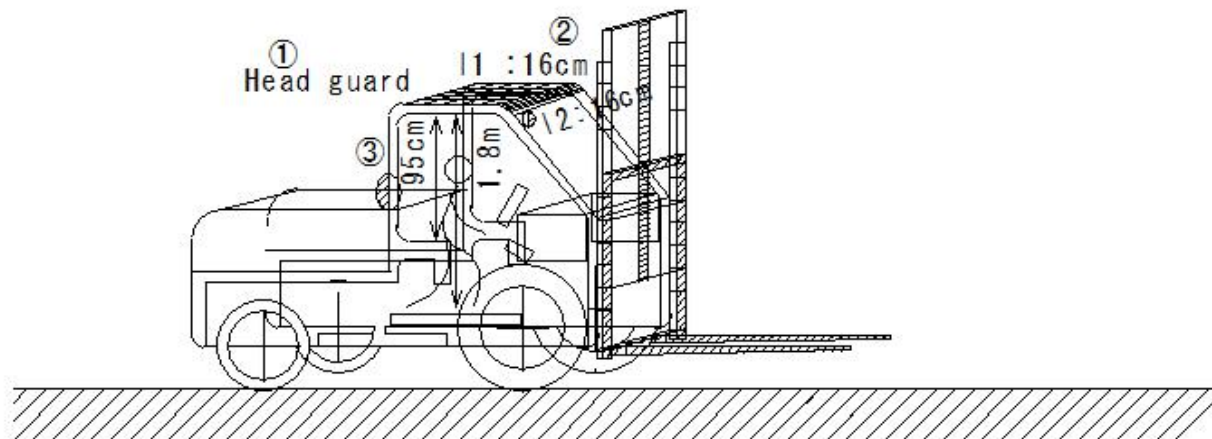
(S591)Forklift

(S591)Forklift

Structural management of forklifts

Head guard

- ① Strength must withstand an evenly distributed load of twice the maximum load
- ② Width or length of each opening in the upper frame (l1, l2) is 16 cm
- ③ Driver's seat height Sitting operation: 95 cm or more Standing operation: 1.8 m or more



Forklift

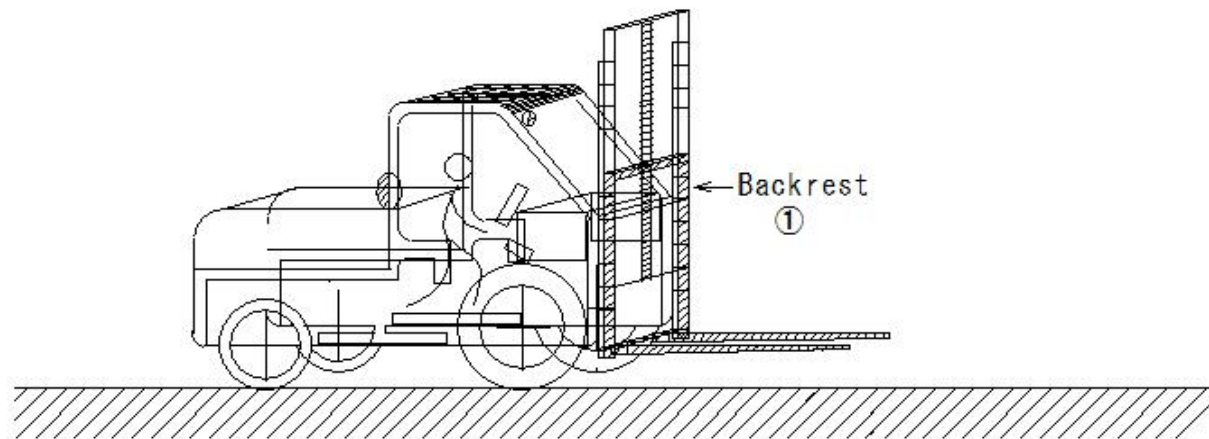
(S592)Forklift

(S592)Forklift

Structural management of forklifts

Backrest

① Equipped with a backrest



Forklift

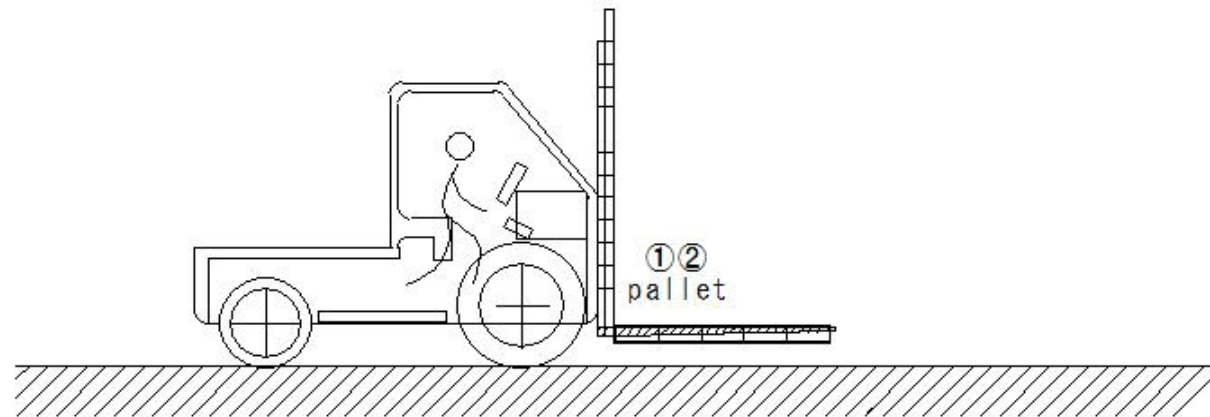
(S593)Forklift

(S593)Forklift

Structural management of forklifts

Pallet or skid

- ① Sufficient strength according to the weight of the load to be loaded
- ② No significant damage, deformation or corrosion



Forklift

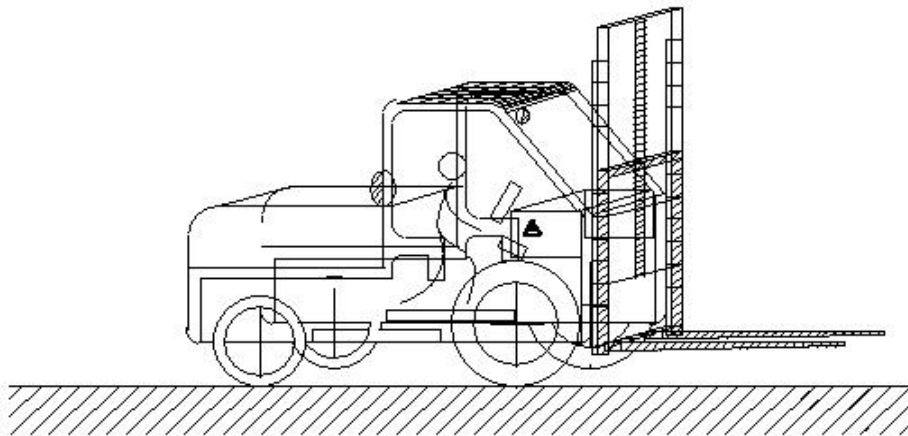
(S594)Forklift

(S594)Forklift

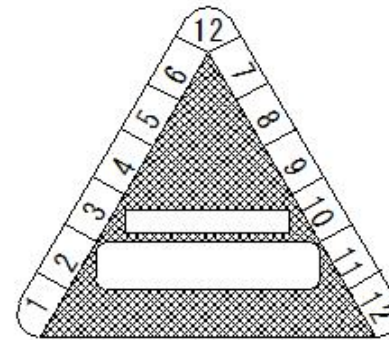
Structural management of forklifts

Periodic self-inspection, etc.

- ① Periodic self-inspection once per year
- ② Periodic self-inspection once per month
- ③ Record the results of the periodic self-inspection and keep them for three years
- ④ Inspection must be carried out before the start of work on that day
- ⑤ Immediate repairs must be made if any abnormalities are found during the inspection



Forklift



Inspection mark

(S595)Dump Truck

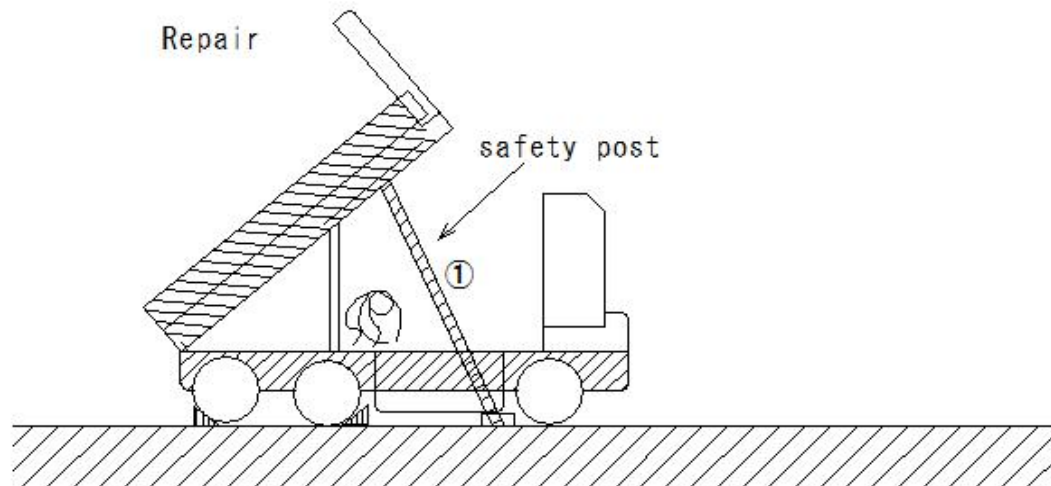
(S595)Dump Truck

Preventing dump truck bed from falling

No entry measures

① Raise the bed of the dump truck

In case of carrying out repairs, inspections, etc. underneath, prevent the bed from suddenly falling
Safety is ensured by installing safety posts and safety blocks



S539
E340

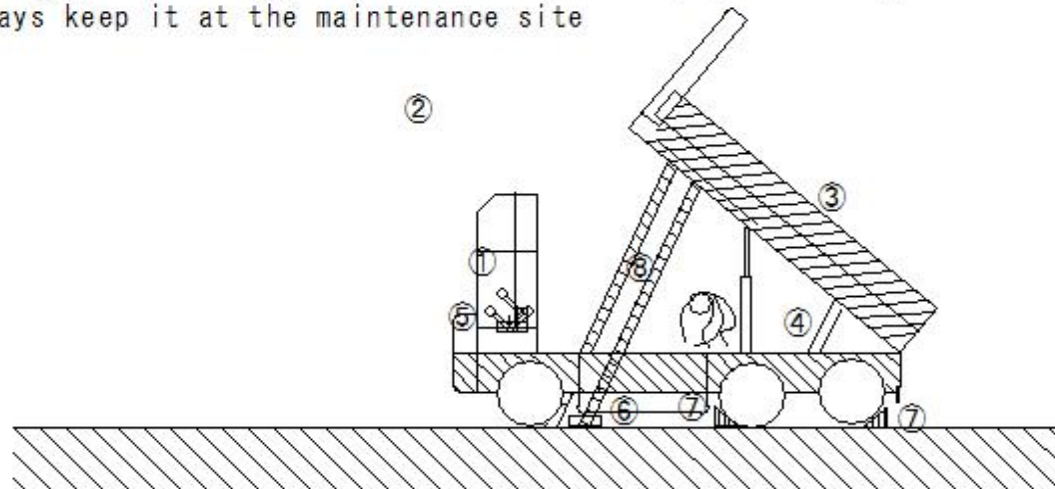
(S596)Dump Truck

(S596)Dump Truck

Preventing dump truck bed from falling

Name of measures, etc.

- ① Dump lever
- ② Monitor the use of safety posts, safety blocks, and stoppers
- ③ Bed (must be empty)
- ④ Safety block
- ⑤ Dump lever lock
- ⑥ 60° to 70°
- ⑦ Pawl (front, rear, left and right, 4 places)
- ⑧ Safety post: A long piece of hardwood or a pipe that supports the dumped bed.
Always keep it at the maintenance site



S539
E340

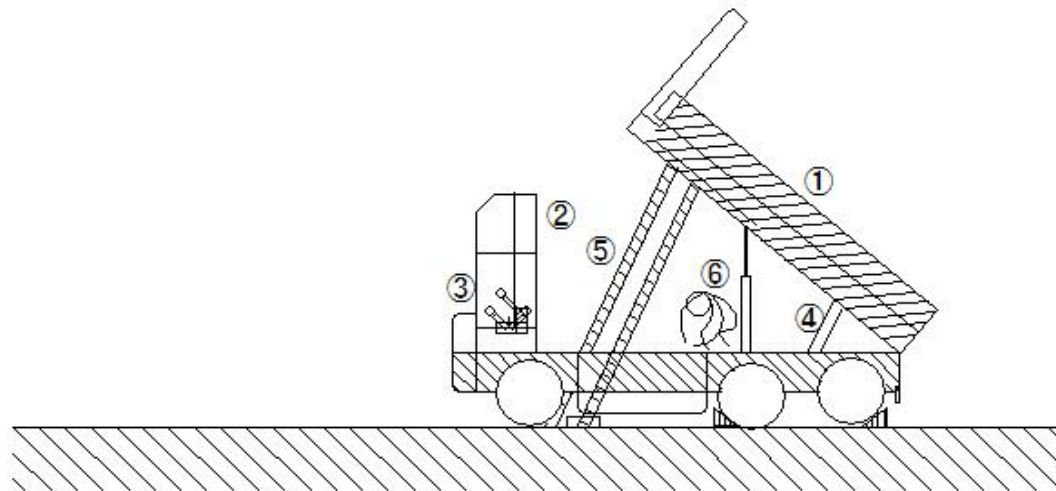
(S597)Dump Truck

(S597)Dump Truck

Preventing the bed of a dump truck from falling

Precautions when raising the bed

- ① In case of raising the bed for inspection and maintenance, do so while the vehicle is empty
- ② In case of entering under the bed while the dump truck is in the dump truck
for maintenance and inspection,
- ③ Always stop the engine
- ④ Use a safety block
- ⑤ Always use a safety support during maintenance
- ⑥ Do not enter under the bed without using a safety support



S539
E340

(S598)Dump Truck

(S598) Dump Truck

Preventing the bed of a dump truck from falling

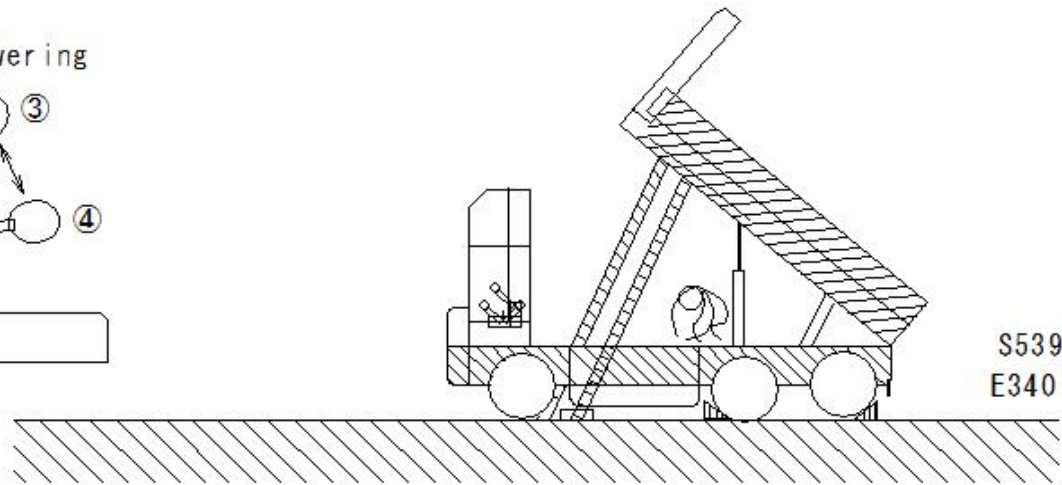
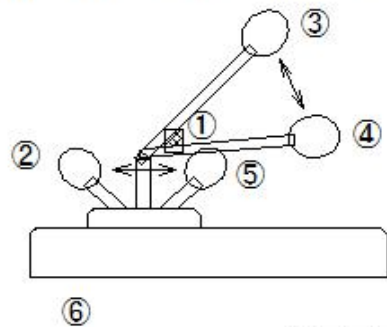
An example of a dump lever lock device

The dump lever lock device in the driver's cab is used to prevent the bed

from falling due to incorrect operation when the bed is raised, so it must be used.

UD Trucks

- ① Lock lever
- ② Lock
- ③ Raise
- ④ Lower
- ⑤ Open
- ⑥ Can be locked by raising or lowering



(S599)Dump Truck

(S599)Dump Truck

Preventing the bed of a dump truck from falling

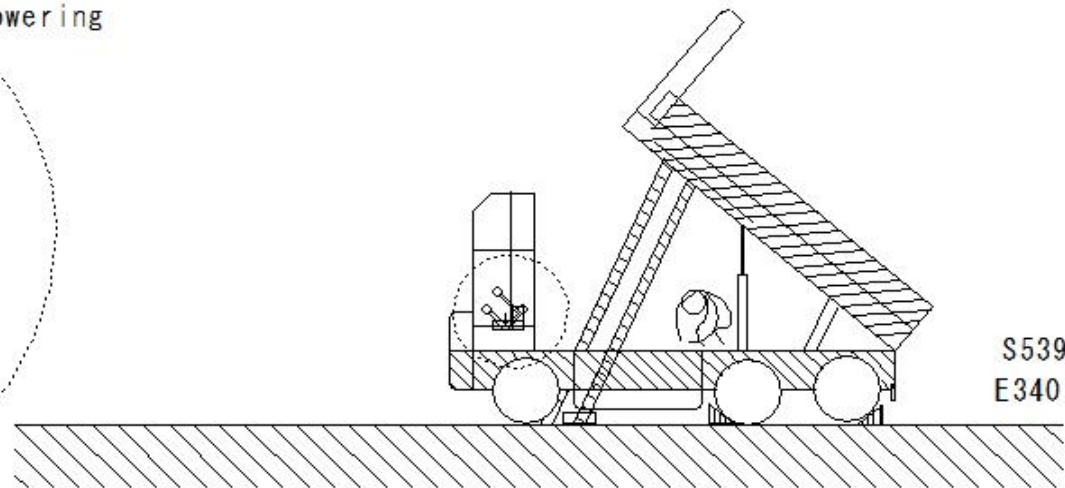
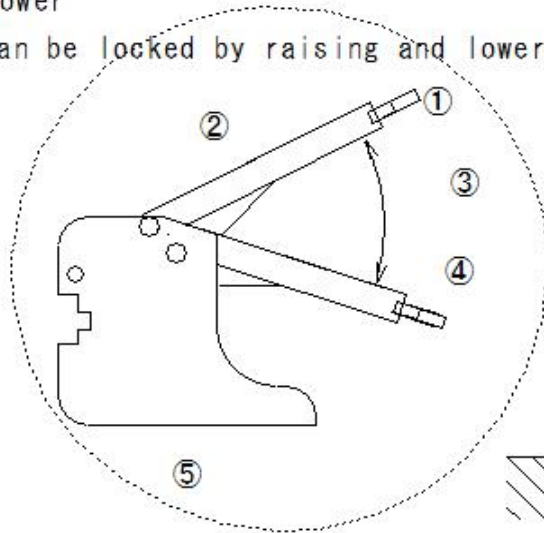
An example of a dump lever lock device

The dump lever lock device in the driver's cab is used to prevent the bed

from falling due to incorrect operation when the bed is raised, so it must be used.

Isuzu

- ① Lock button
- ② Unlock
- ③ Raise
- ④ Lower
- ⑤ Can be locked by raising and lowering



(S600)Dump Truck

(S600)Dump Truck

Preventing the bed of a dump truck from falling

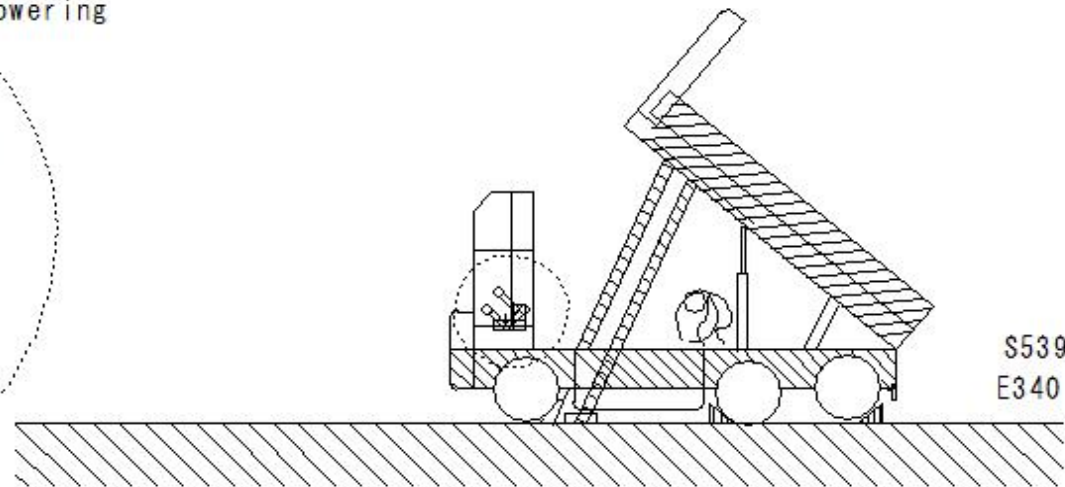
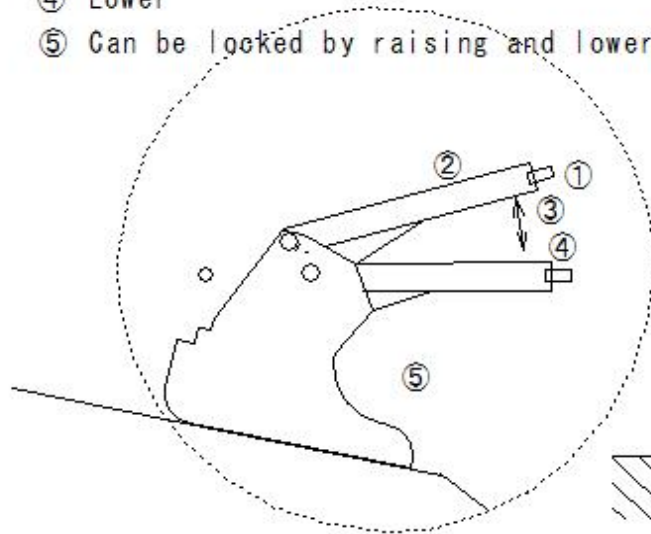
An example of a dump lever lock device

The dump lever lock device in the driver's cab is used to prevent the bed

from falling due to incorrect operation when the bed is raised, so it must be used.

Hino

- ① Lock button
- ② Unlock
- ③ Raise
- ④ Lower
- ⑤ Can be locked by raising and lowering



S539
E340

(S601)Road Traffic Act

(S601)Road Traffic Act

Outline of the Road Traffic Act to prevent overloading

Vehicle classification

Type of vehicle	Eligibility to take the exam	Vehicle classification	
		Total vehicle weight	Maximum load
Large vehicle	21 years old or older, regular license holder for 3 years or more	11t or more	6.5t or more
Medium-sized vehicle	20 years old or older, regular license holder for 2 years or more	7.5t or more, less than 11t	4.5t or more, less than 6.5t
Semi-medium-sized vehicle	18 years old or older	3.5t or more, less than 7.5t	2t or more, less than 4.5t
Standard vehicle		Less than 3.5t	Less than 2t

(S602)Off-Road Vehicles

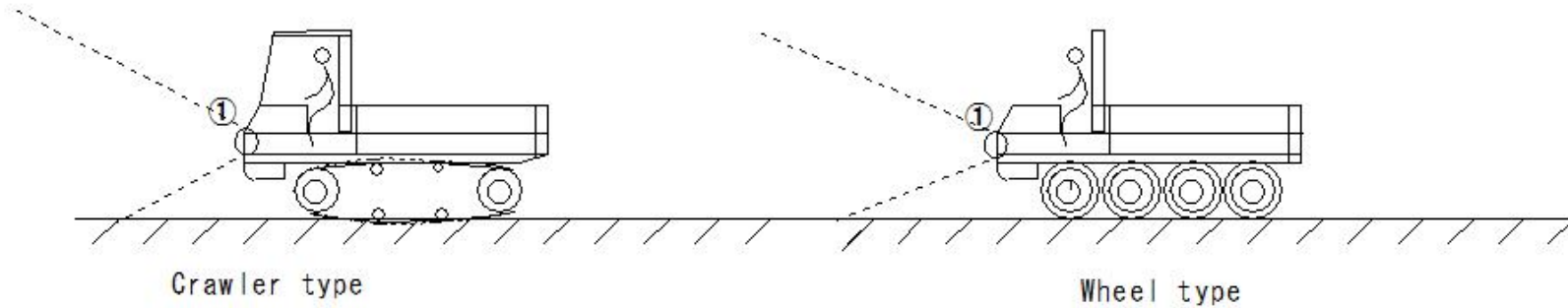
(S602) Off-Road Vehicles

Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

① Equipped with headlights and taillights



(S603)Off-Road Vehicles

(S603)Off-Road Vehicles

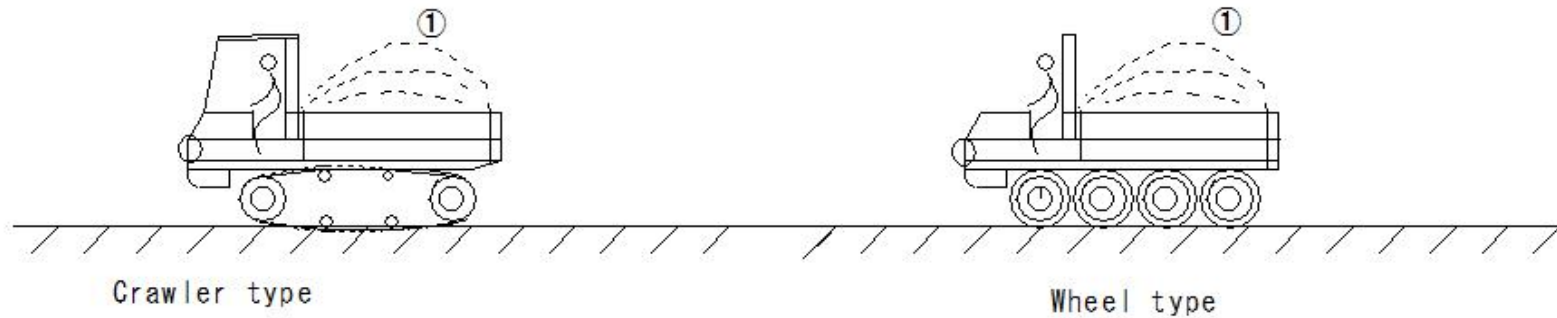
Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

① Restrictions on use

Prohibition on excessive loading



(S604)Off-Road Vehicles

(S604)Off-Road Vehicles

Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

① Prohibition on use of unsuitable fiber rope

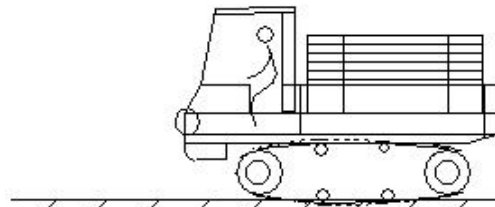
Those with broken strands

Those with significant damage or corrosion

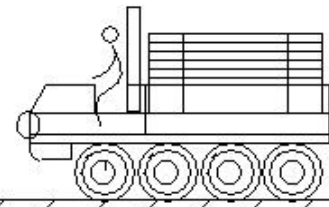
Damage Corrosion



Damage Corrosion



Crawler type



Wheel type

(S605)Off-Road Vehicles

(S605) Off-Road Vehicles

Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

- ① Inspect fiber rope
- ② Inspect before starting use on the day



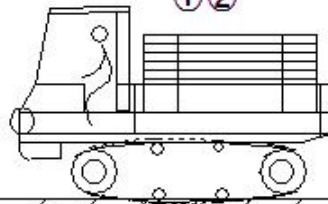
①②



fiber rope

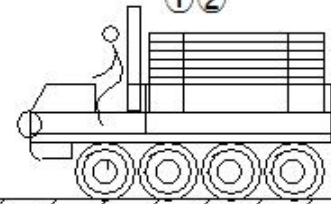
Damage Corrosion

①②



Crawler type

①②



Wheel type

(S606)Off-Road Vehicles

(S606) Off-Road Vehicles

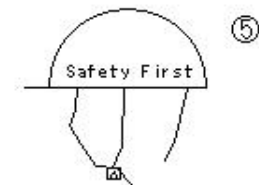
Safe operation of off-road vehicles

Off-road vehicles

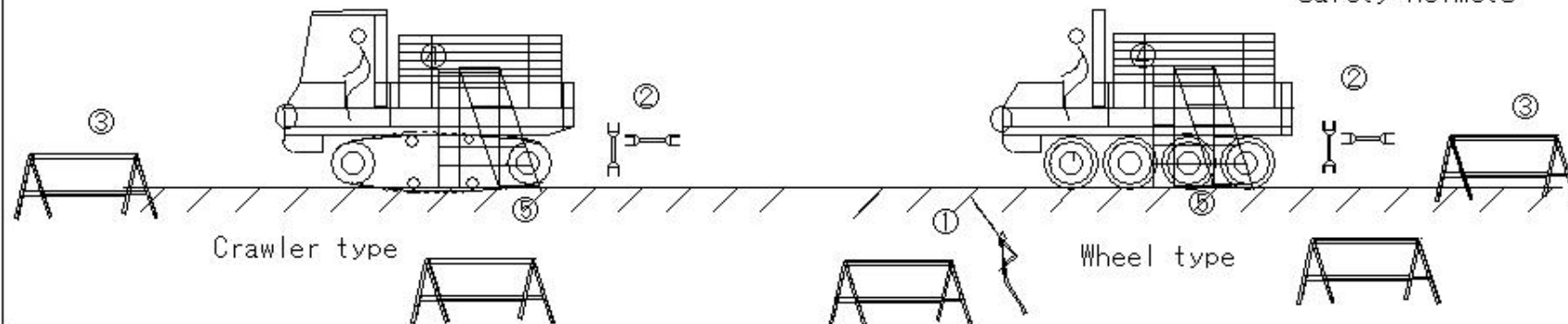
Crawler type/wheel type

Loading and unloading: Appoint work leader

- ① Work procedure: Decide the work method and directly supervise the work
- ② Equipment: Inspect tools, remove defective items
- ③ Work area: No entry
- ④ Rope: Sheet removal work: Confirm that there is no risk of load falling
- ⑤ Lifting equipment: Monitor the use of safety helmets



safety helmets



(S607)Off-Road Vehicles

(S607)Off-Road Vehicles

Safe operation of off-road vehicles

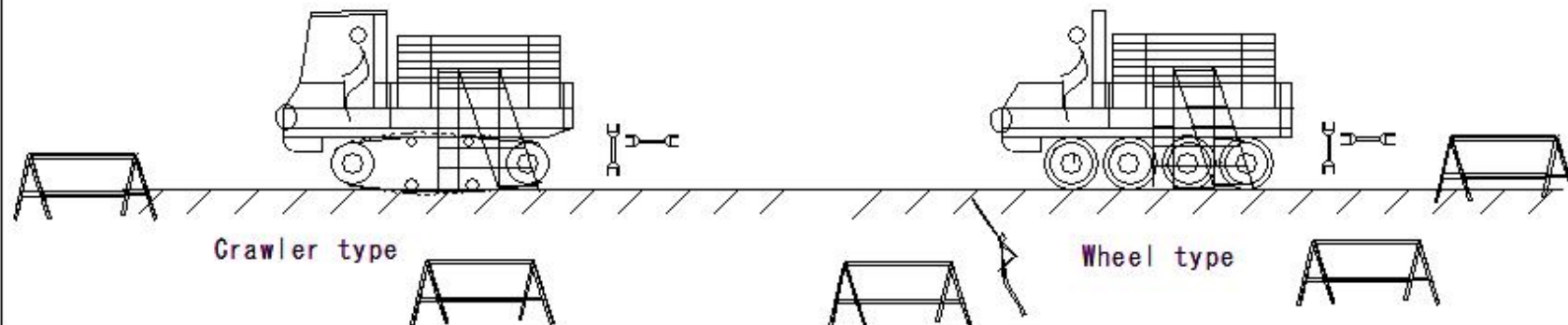
Off-road vehicles

Crawler type/wheel type

Periodic voluntary inspection

- ① Annual inspection, period not exceeding 2 years
- ② Monthly inspection, period not exceeding 1 month
- ③ Annual inspection is a specific voluntary inspection, and an inspection mark is affixed

Periodic voluntary inspection



(S608)Off-Road Vehicles

(S608)Off-Road Vehicles

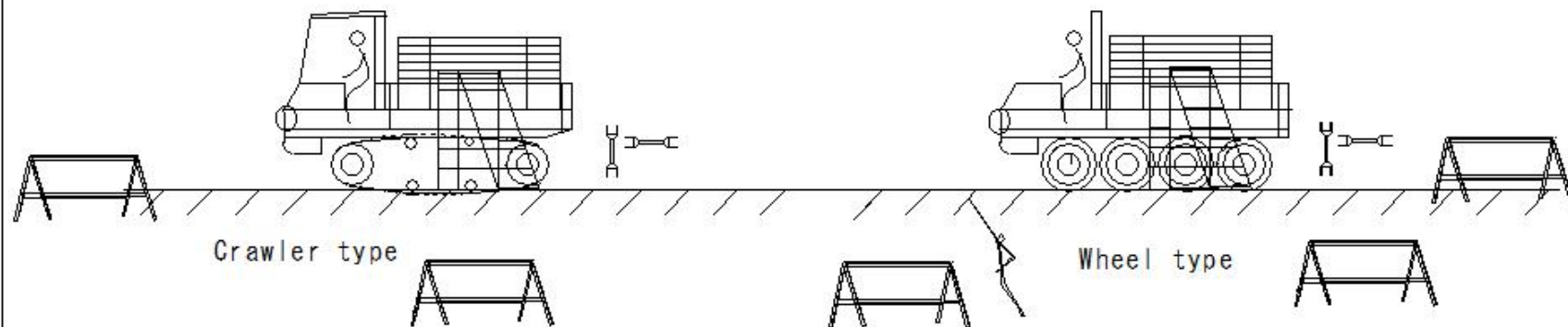
Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

Periodic voluntary inspection Records

① Keep for 3 years



(S609)Off-Road Vehicles

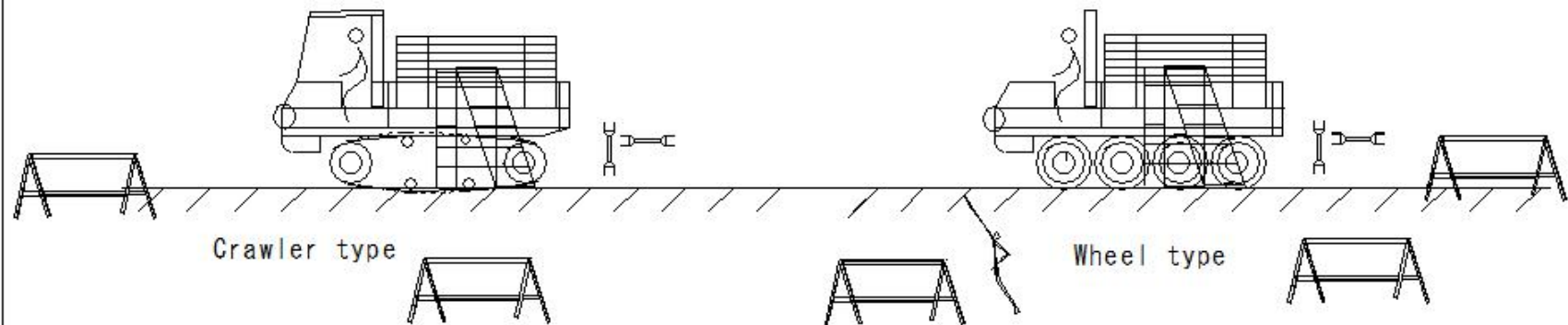
(S609)Off-Road Vehicles

Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

① Inspection before starting work



(S610)Off-Road Vehicles

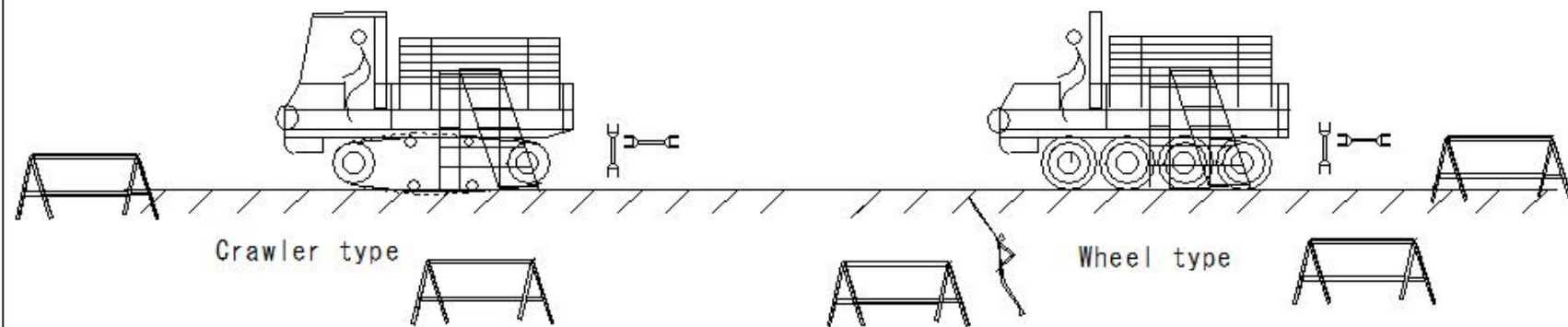
(S610)Off-Road Vehicles

Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

- ① Repairs, etc.
- ② Repair immediately in case of abnormality



(S611)Off-Road Vehicles

(S611)Off-Road Vehicles

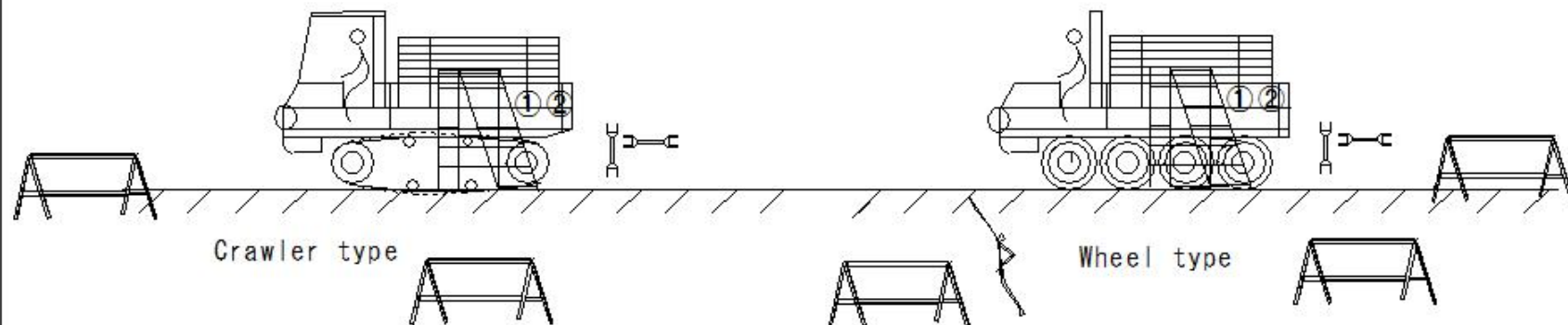
Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

① Lifting equipment

② In case of loading and unloading cargo on off-road vehicles with a maximum load capacity of 5t or more, install lifting equipment



(S612)Off-Road Vehicles

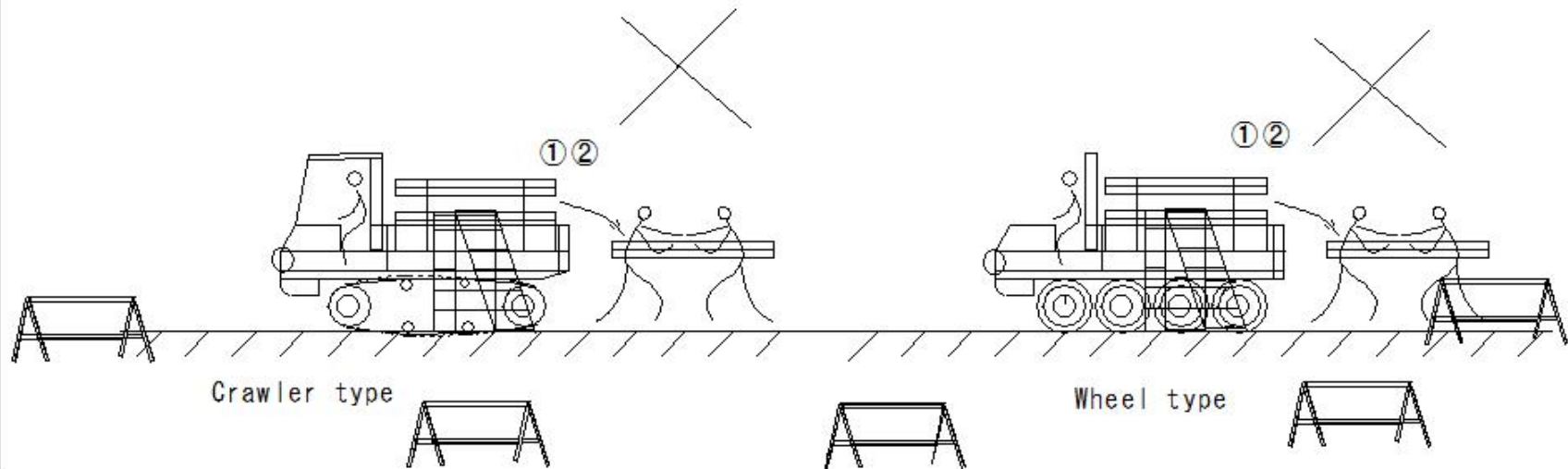
(S612)Off-Road Vehicles

Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

- ① Prohibition of removal of the center
- ② Prohibition of removal of the center during unloading work



(S613)Off-Road Vehicles

(S613)Off-Road Vehicles

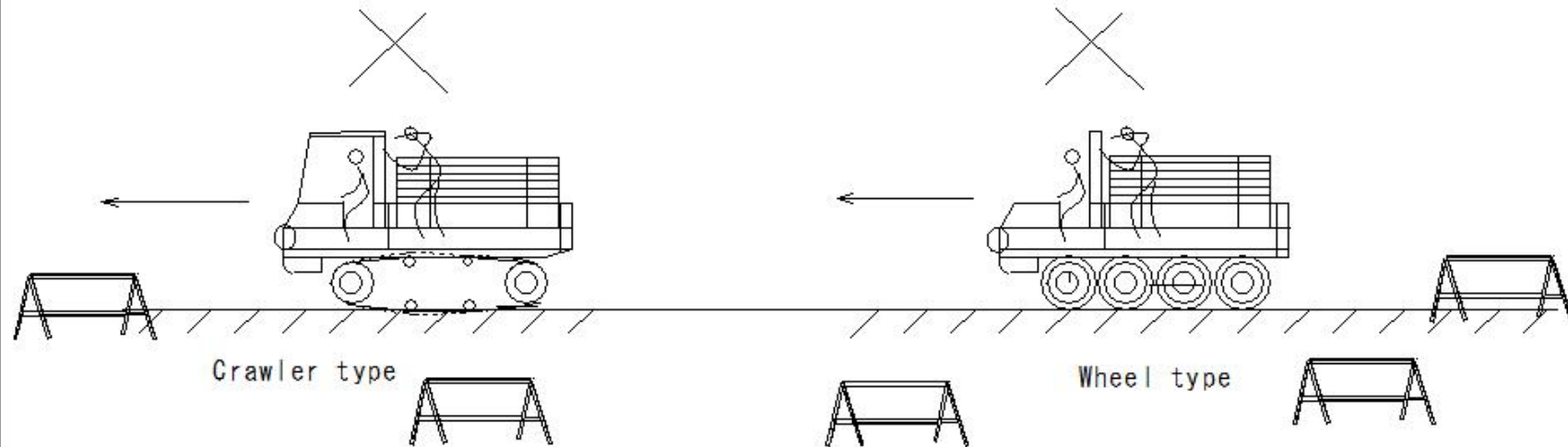
Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

① Restrictions on riding on the loading platform

Do not allow people to ride on the loading platform when driving a vehicle without side gates
on the loading platform



(S614)Off-Road Vehicles

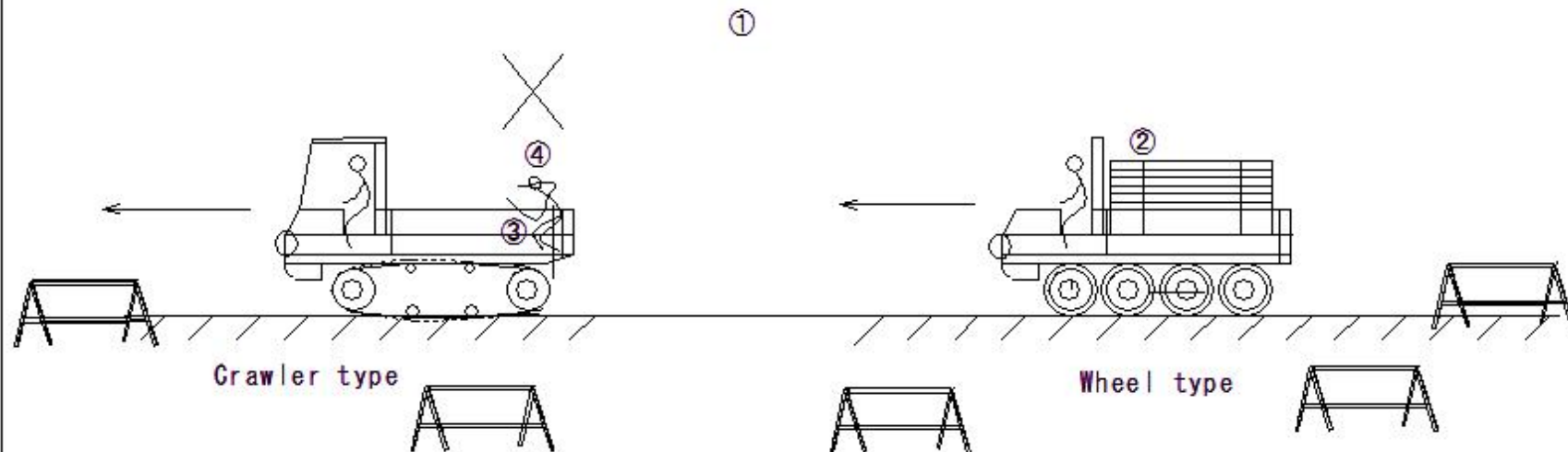
(S614)Off-Road Vehicles

Safe operation of off-road vehicles

Off-road vehicles

Crawler type/wheel type

- ① Measures to take in case of driving on off-road vehicles with side gates on the loading platform with people
- ② Measures to stop the load, such as taking measures to prevent slipping
- ③ Make sure the side gates are closed
- ④ Do not ride in areas where there is a risk of falling



(S615)Off-Road Vehicles

(S615)Off-Road Vehicles

Safe operation of off-road vehicles

Off-road vehicles

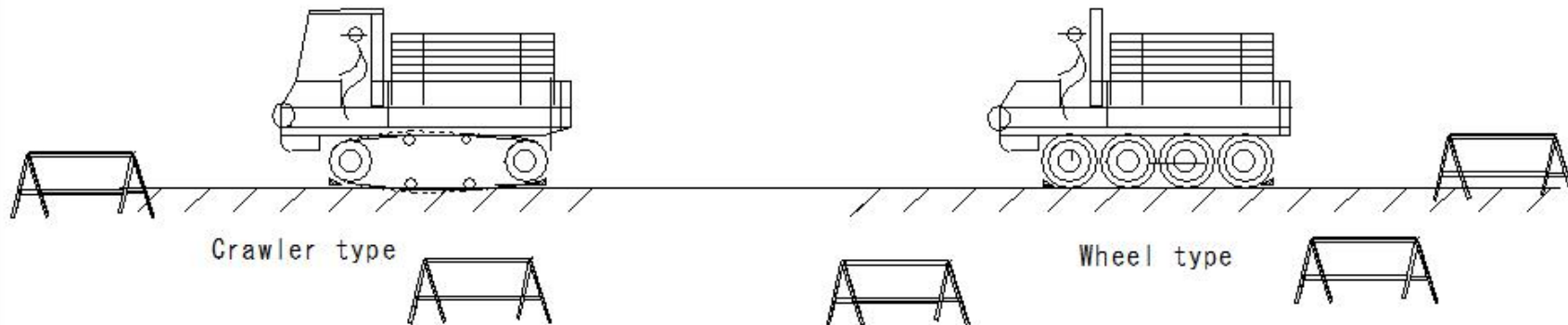
Crawler type/wheel type

- ① Wear a protective helmet
- ② Wear a protective helmet when loading and unloading cargo in case of the maximum load capacity is 5t or more



safety helmets

①②



(S616) Freight Vehicles

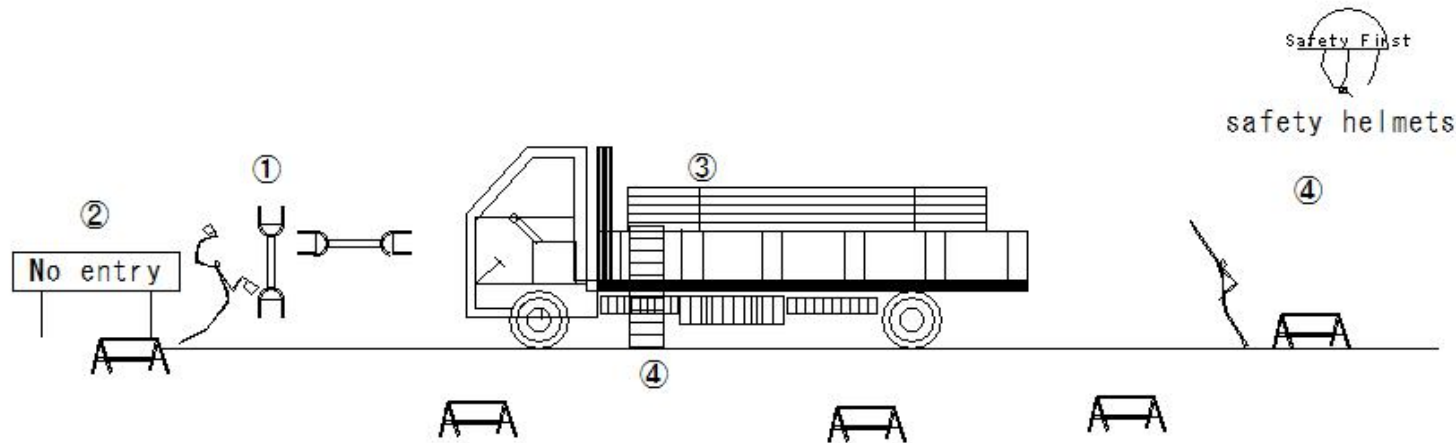
(S616) Freight Vehicles

Safe work for freight vehicles

Appoint a loading/unloading work supervisor

Determine the work procedures and methods, and directly supervise the work

- ① Inspect equipment and tools, remove defective items
- ② Sign that entry is prohibited to anyone other than those involved
- ③ In case of untying ropes and removing sheets, instruct the work to begin only after confirming that the load has not fallen
- ④ Monitor the use of lifting equipment and protective helmets

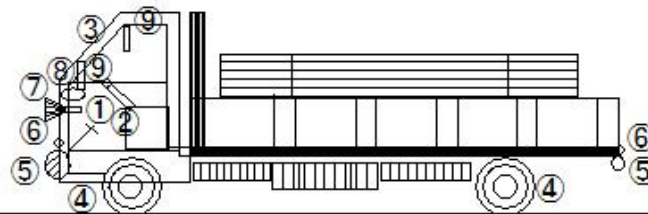


(S617) Freight Vehicles

(S617) Freight Vehicles

Safe work for freight vehicles

- ①Braking devices, etc.
- ②Equipped with effective braking devices
- ③Use of safety glass on the front, etc.
- ④Tires must be free of significant damage
- ⑤Equipped with headlights and taillights
- ⑥One turn signal on each side
- ⑦Equipped with a warning sounder
- ⑧Equipped with a speedometer
- ⑨Equipped with a rearview mirror

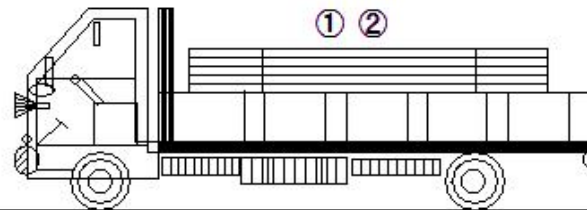


(S618) Freight Vehicles

(S618) Freight Vehicles

Safe work for freight vehicles

- ① Restrictions on use
- ② Do not use beyond the maximum load

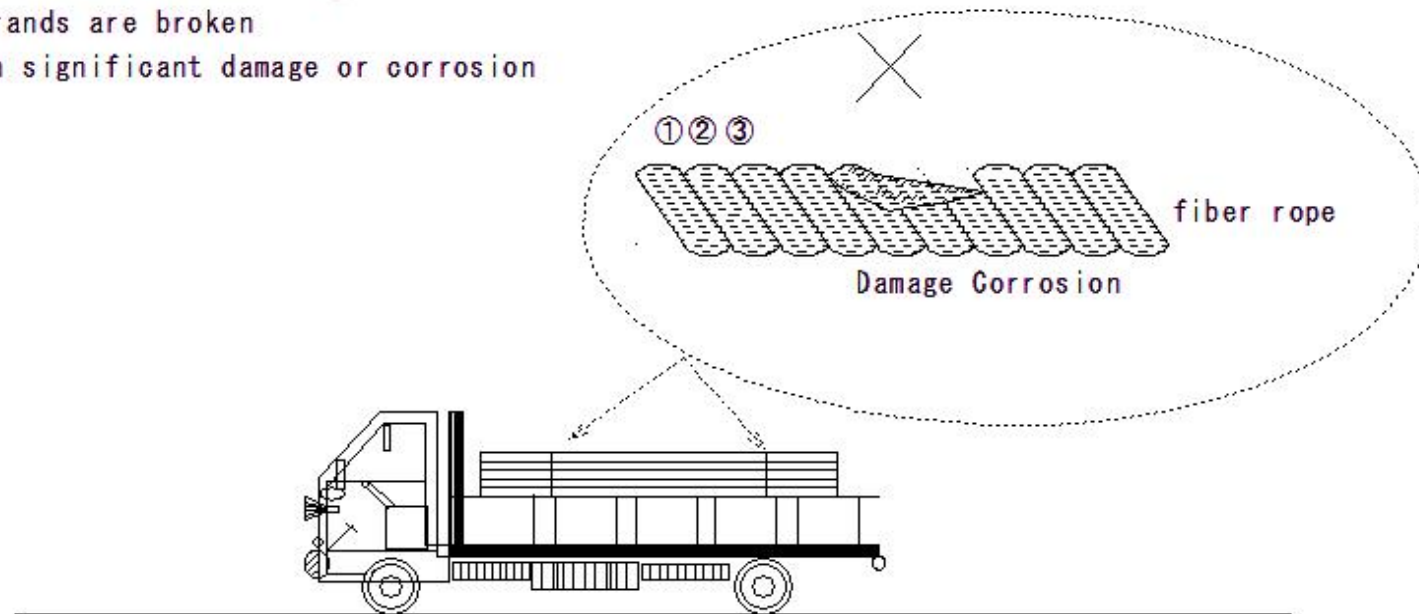


(S619) Freight Vehicles

(S619) Freight Vehicles

Safe work for freight vehicles

- ① Do not use unsuitable fiber ropes
- ② If the strands are broken
- ③ Those with significant damage or corrosion



(S620) Freight Vehicles

(S620) Freight Vehicles

Safe work for freight vehicles

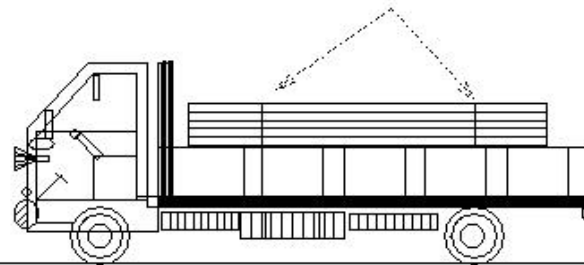
- ① Inspection of fiber ropes
- ② Inspect before use
- ③ Replace immediately if abnormality is found

①②③



fiber rope

Damage Corrosion

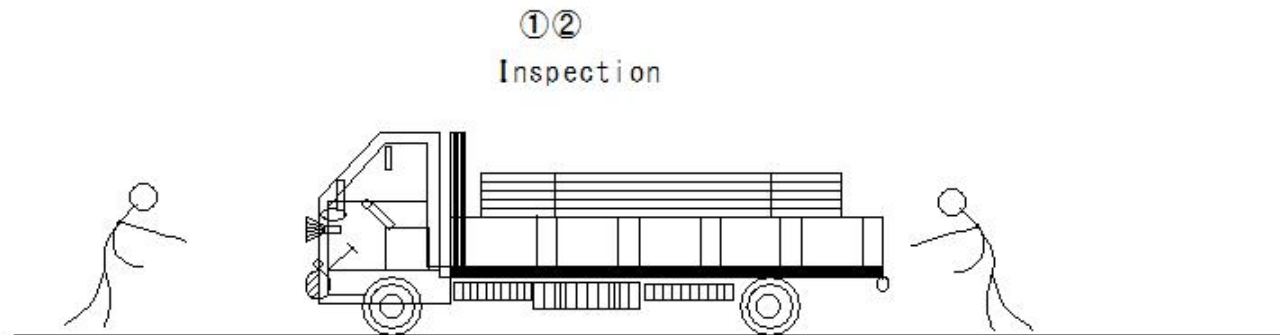


(S621) Freight Vehicles

(S621) Freight Vehicles

Safe work for freight vehicles

- ① Inspection
- ② Inspect before starting work for the day

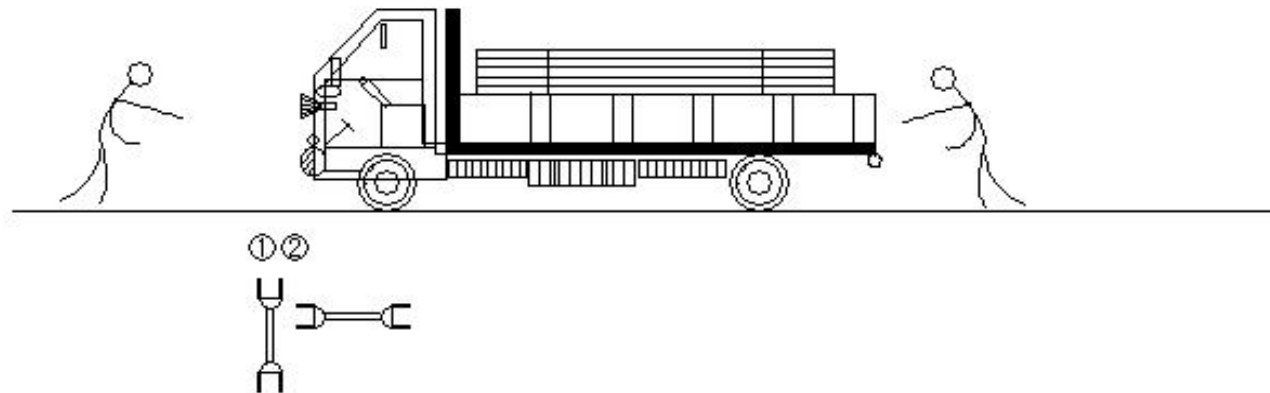


(S622) Freight Vehicles

(S622) Freight Vehicles

Safe work for freight vehicles

- ① Repairs
- ② Replace immediately if abnormality is found

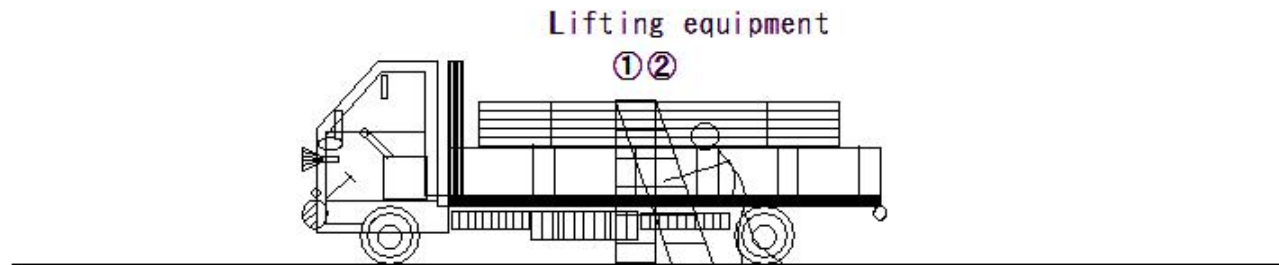


(S623) Freight Vehicles

(S623) Freight Vehicles

Safe work for freight vehicles

- ① Lifting equipment
- ② Install safe lifting equipment when loading and unloading cargo
on vehicles weighing 5 tons or more

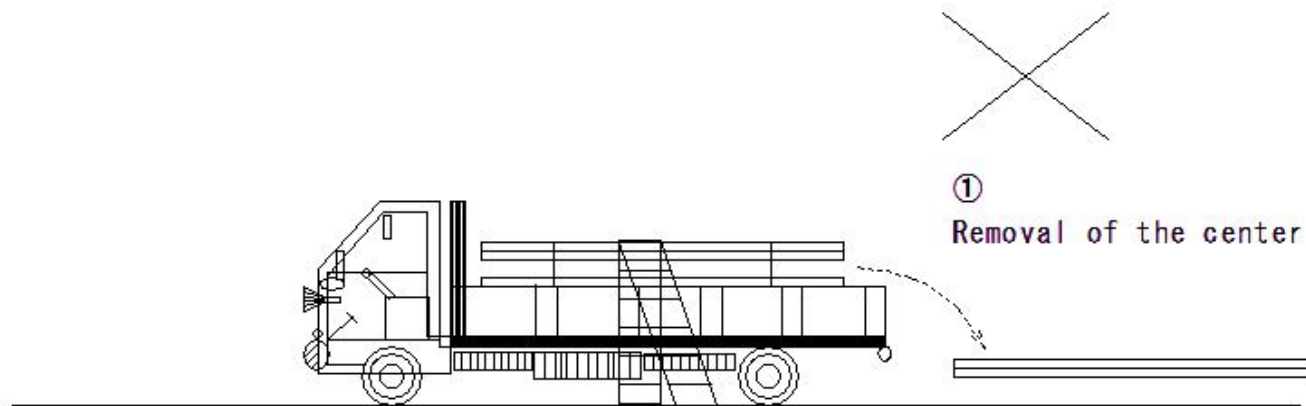


(S624) Freight Vehicles

(S624) Freight Vehicles

Safe work for freight vehicles

① Prohibition of removal of the center

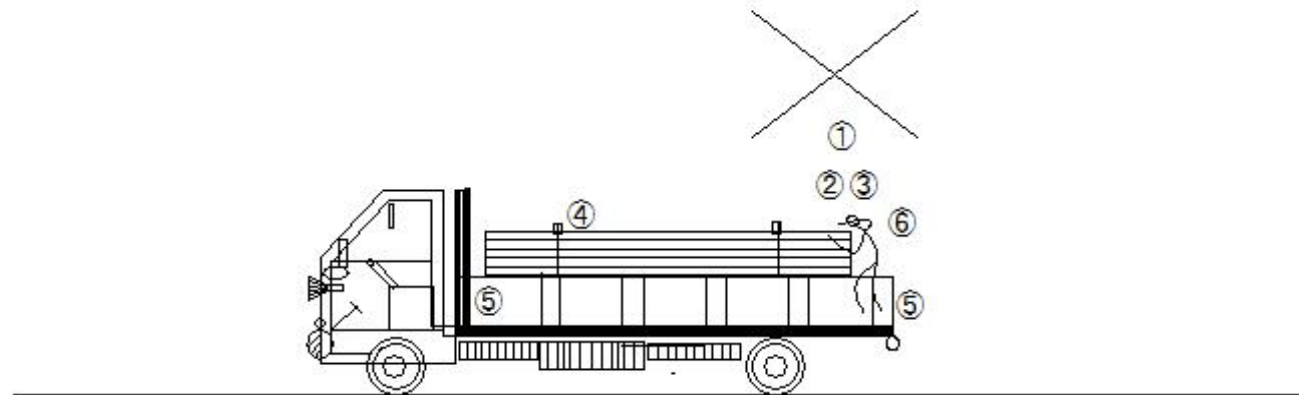


(S625) Freight Vehicles

(S625) Freight Vehicles

Safe work for freight vehicles

- ① Restrictions on riding in the loading platform
- ② For vehicles without side gates, do not ride in the loading platform while the vehicle is moving
- ③ In case of riding in the loading platform of a vehicle with side gates
- ④ Measures to stop the load and prevent slipping
- ⑤ Make sure the side gates are closed
- ⑥ Do not ride in a place where you may fall due to shaking



(S626) Conveyor

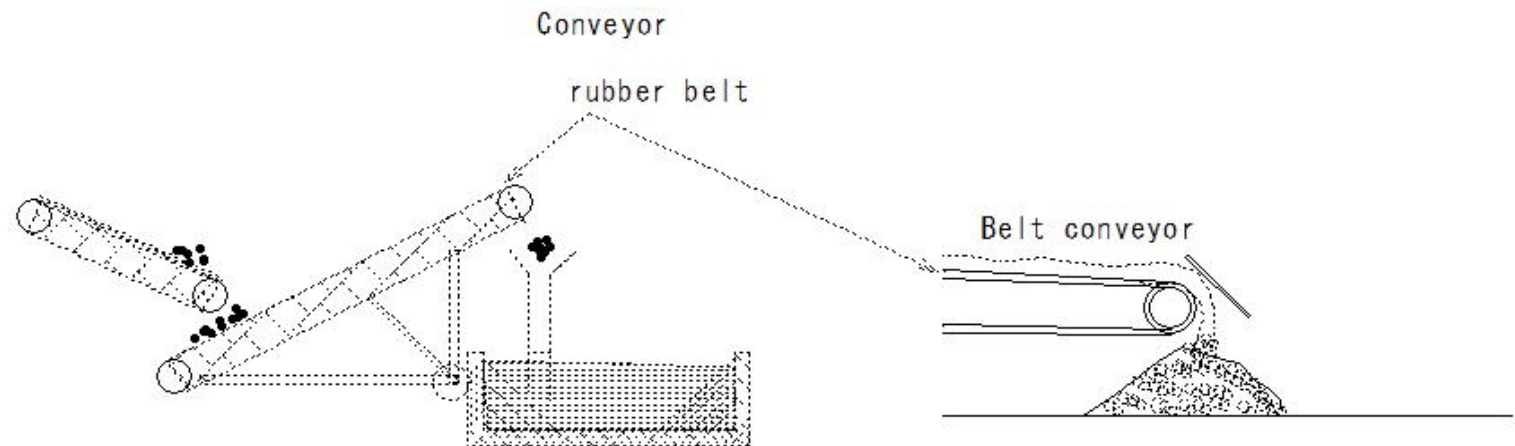
(S626) Conveyor

Conveyor safety work

① Prevention of runaway, etc.

Equip with devices (electromagnetic brakes, etc.) to prevent runaway and reverse movement of loads or carriers due to power outages, voltage drops, etc.

Except when used in a horizontal position and not posing a danger to workers



C1329

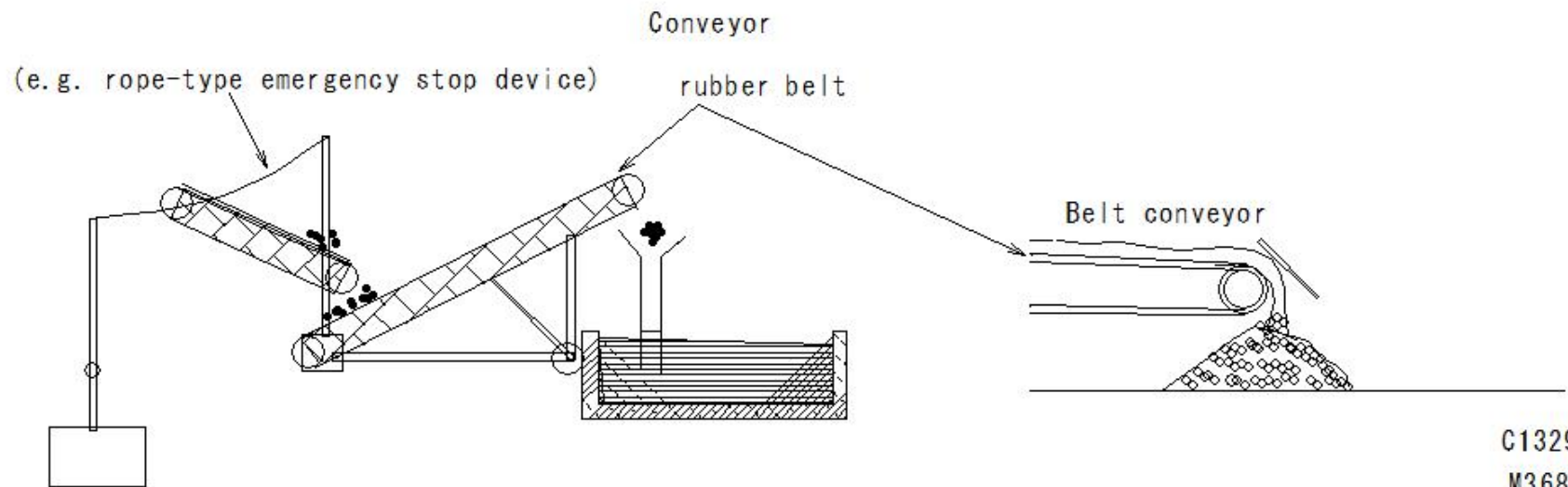
M368

(S627) Conveyor

(S627) Conveyor

Conveyor safety work

Equip with devices that can immediately stop conveyor operation in the event of an emergency



(S628) Conveyor

(S628) Conveyor

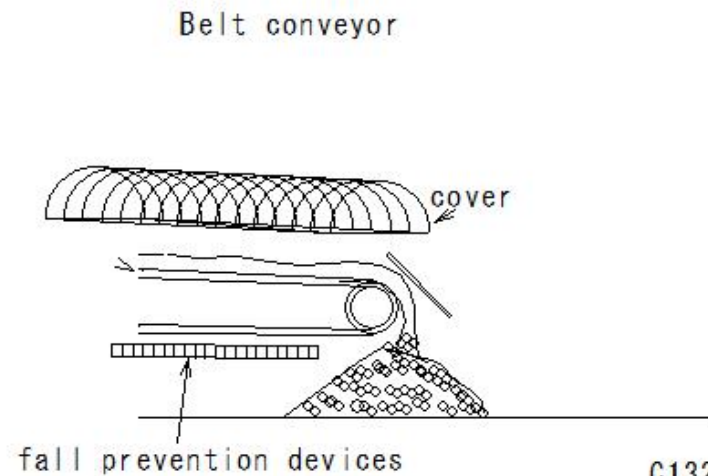
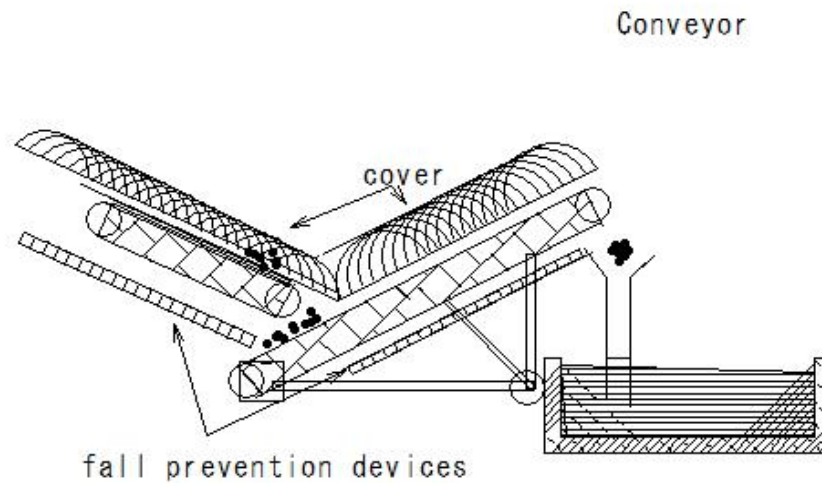
Conveyor safety work

Prevention of load falling

In case of there is a risk of load falling

Install a cover or enclosure on the conveyor

Use fall prevention devices



C1329

M368

(S629) Conveyor

(S629) Conveyor

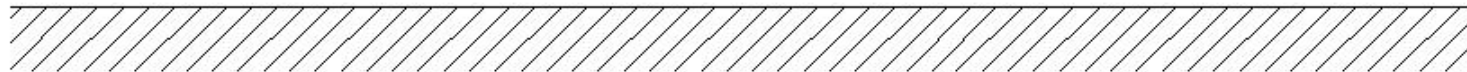
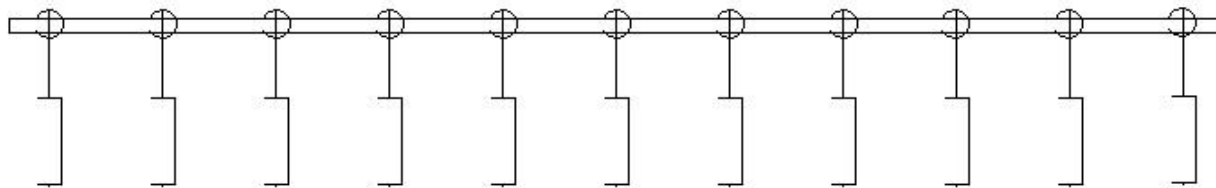
Conveyor safety work

Trolley conveyor

Use a trolley conveyor

Use one that is connected to the trolley, chain, and hanger so that they do not come off

Trolley conveyor



(S630) Conveyor

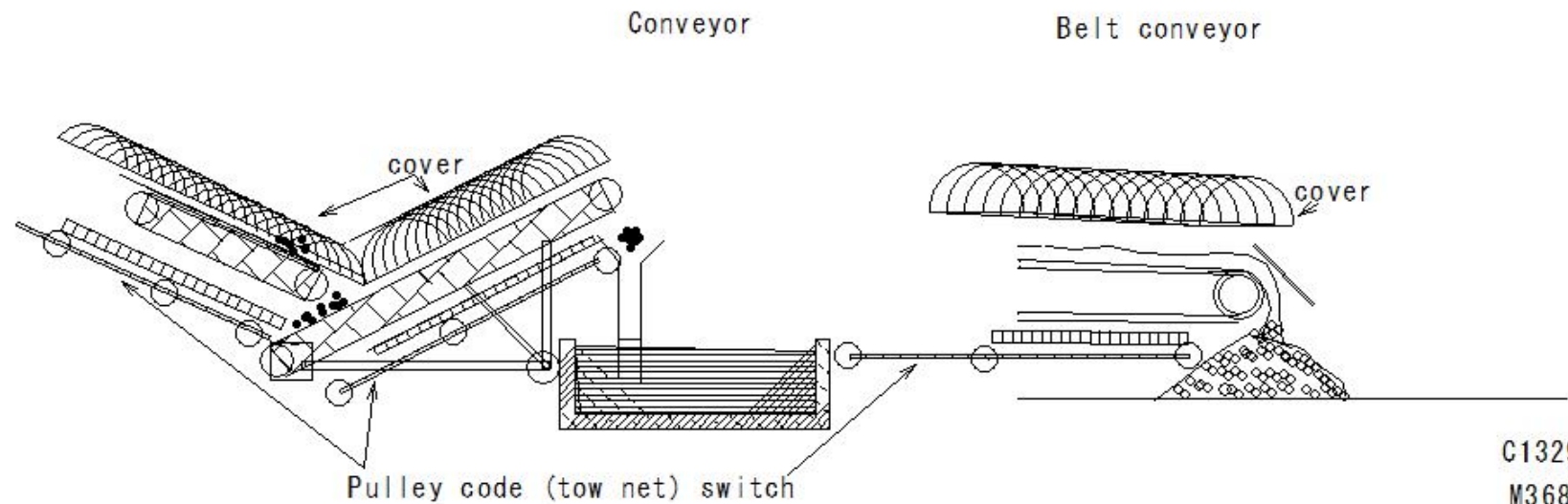
(S630) Conveyor

Conveyor safety work

Inspection

Inspect before starting work

- ① Motor and brake
- ② Function of runaway prevention device
- ③ Function of emergency stop device
- ④ Enclosure of prime mover, rotating shaft, pulley, etc., presence or absence of enclosure, etc.



C1329

M368

(S631) Conveyor

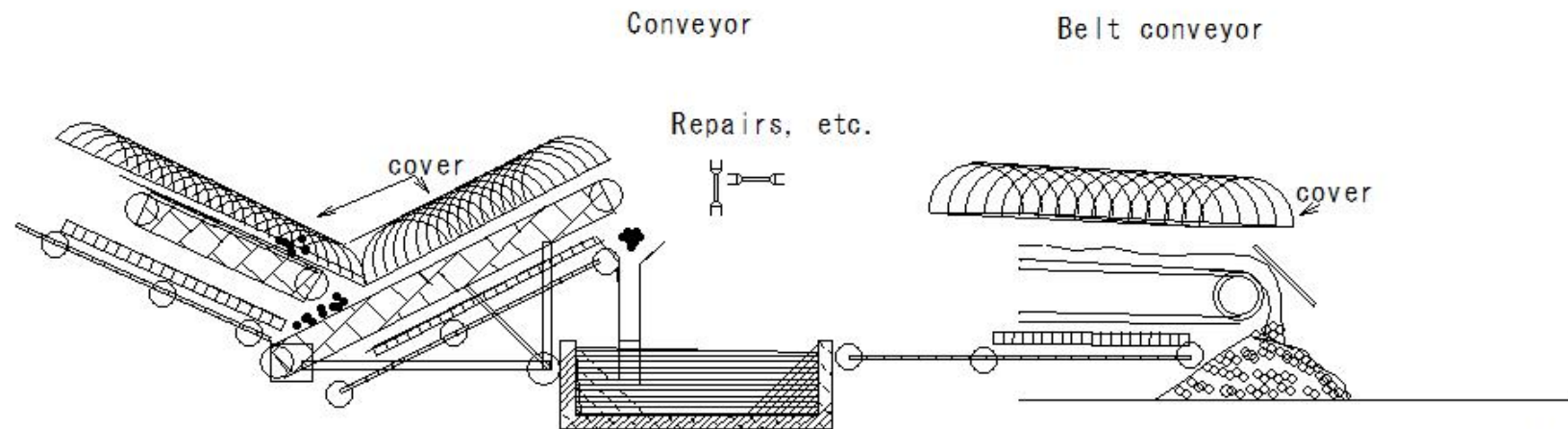
(S631) Conveyor

Conveyor safety work

Repairs, etc.

① In case of an abnormality is recognized

Take repair measures, etc. immediately



C1329

M368

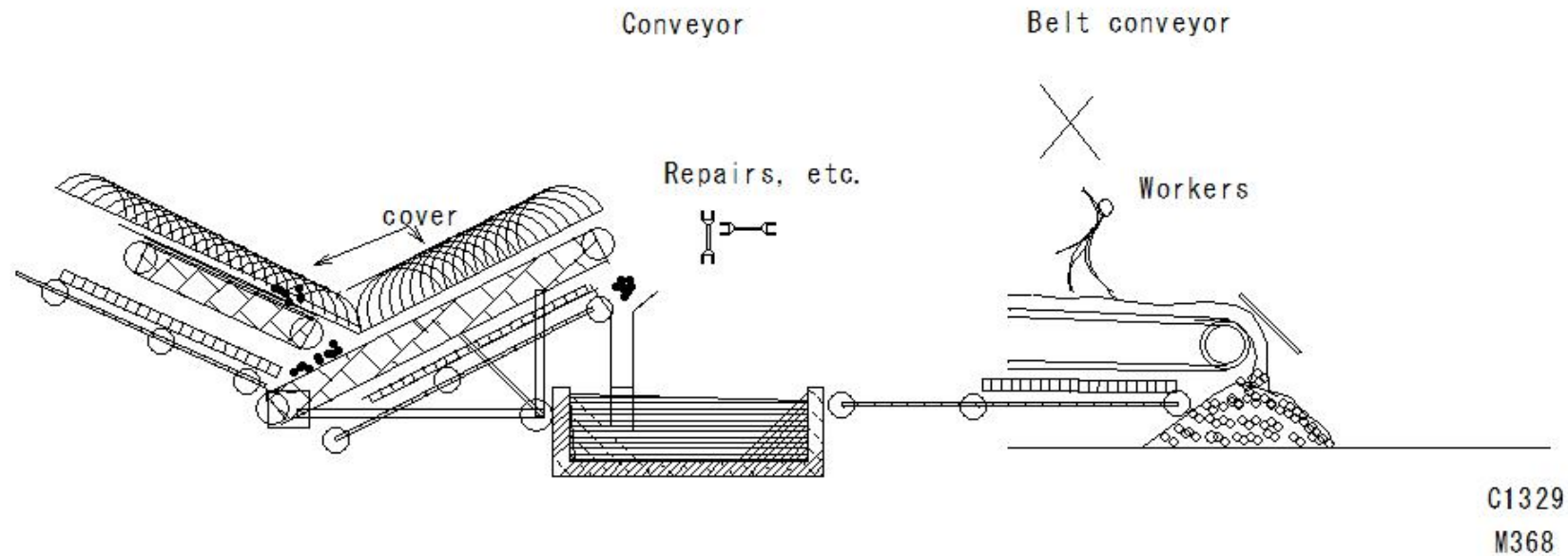
(S632) Conveyor

(S632) Conveyor

Conveyor safety work

Boarding restrictions

- Workers should not ride on conveyors while they are in operation



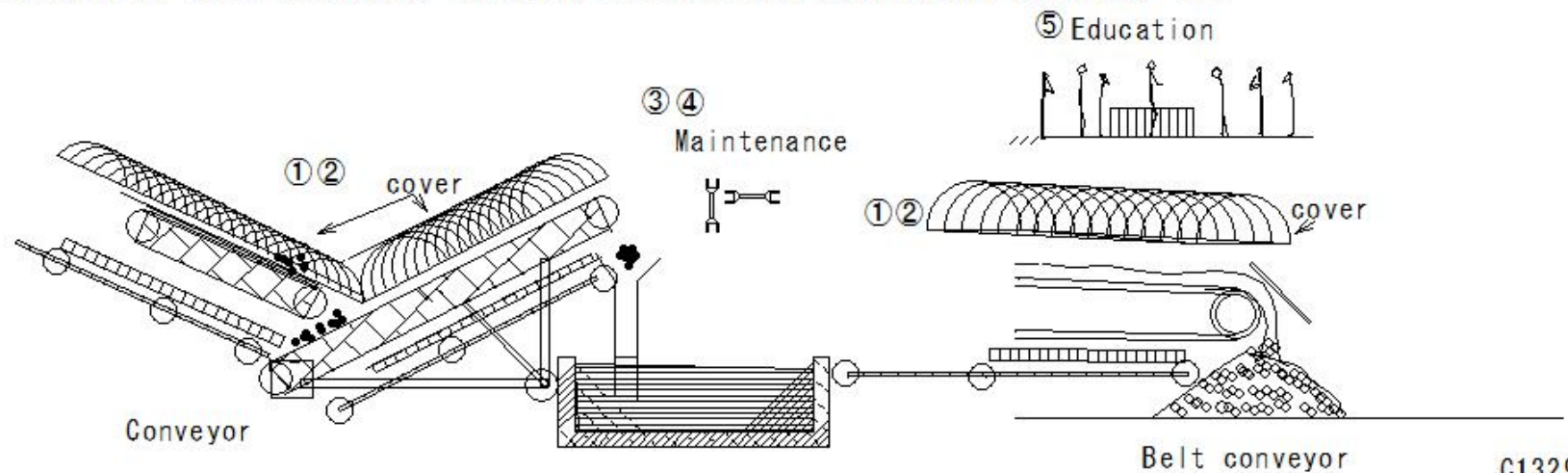
(S633) Conveyor

(S633) Conveyor

Conveyor safety work

Safety standards

- ① Design and manufacturing: sufficient strength
- ② Equipment: dimensions of platforms, walkways, etc., installation method, emergency stop, warning device that warns of track, installation of instruction manual, etc.
- ③ Use: designation of driver, regular inspection and maintenance
- ④ Measures during maintenance work
- ⑤ Education (work standards, handling instructions, maintenance methods), etc.



C1329

M368

(S634) Aerial work vehicles

(S634) Aerial work vehicles

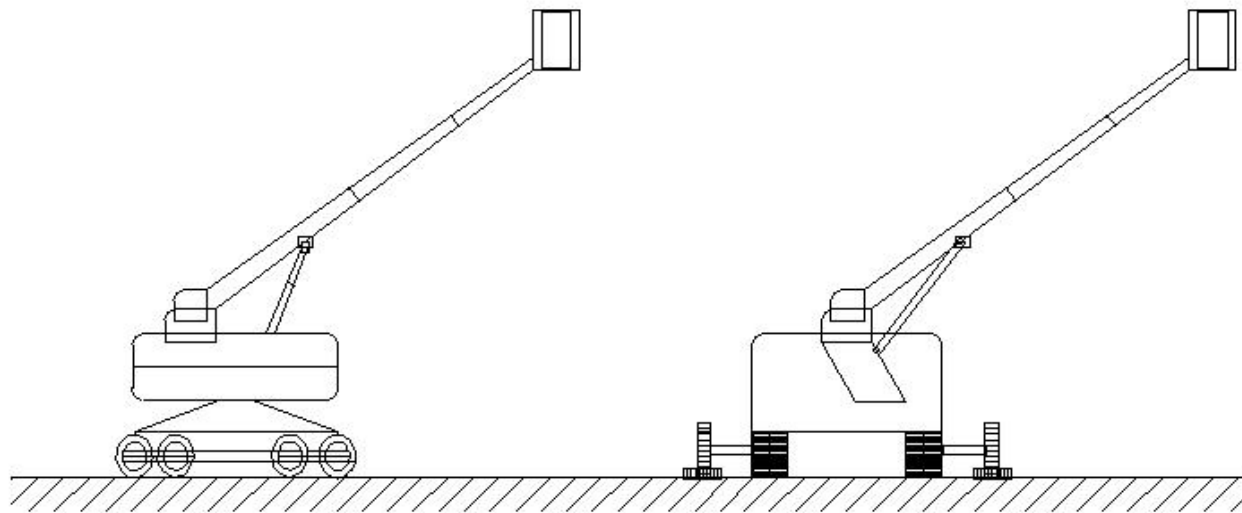
Safe work with aerial work vehicles

Aerial work vehicles

Machines used for construction, inspection, repair, etc. at high altitudes

Consists of a work platform and lifting equipment

Among the equipment in which the work platform rises and falls using a lifting device, etc.,
it can be self-propelled to an unspecified location using power



aerial work vehicles S322

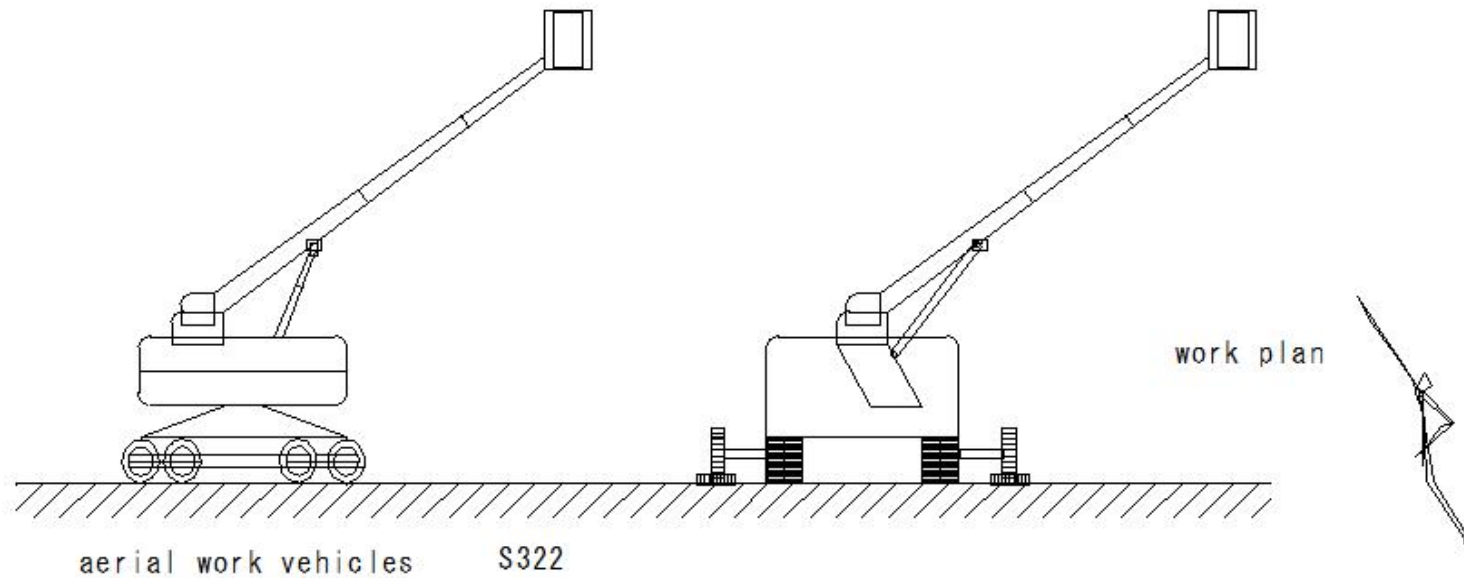
(S635) Aerial work vehicles

(S635) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Create a work plan



(S636) Aerial work vehicles

(S636) Aerial work vehicles

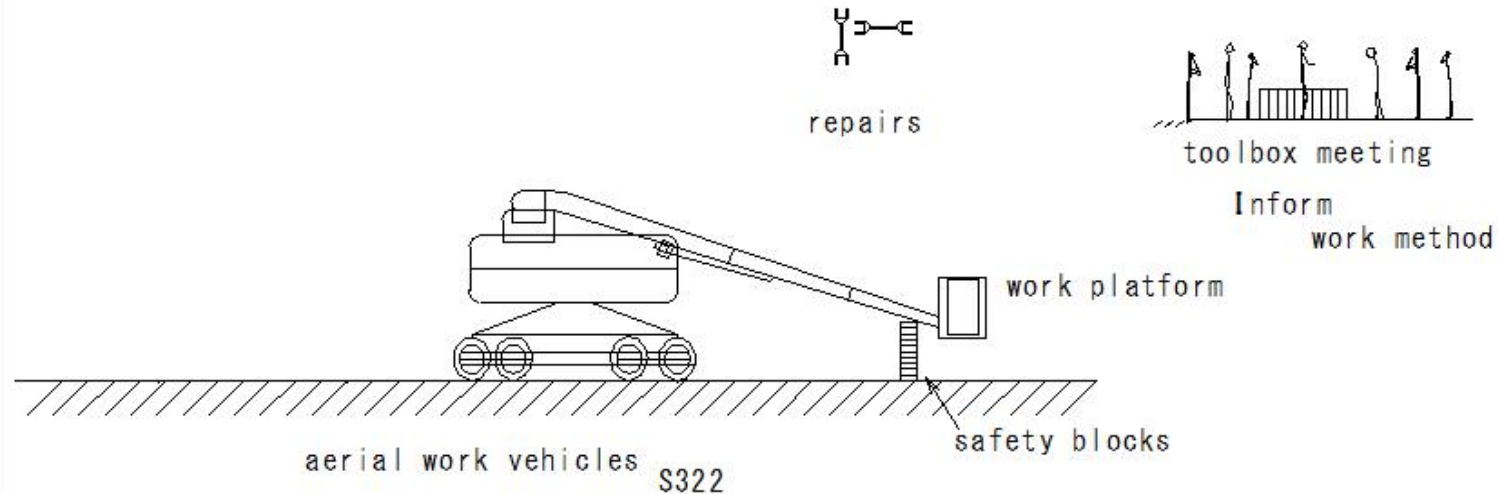
Safe work with aerial work vehicles

Aerial work vehicles

In case of carrying out repairs or operating a work platform

Inform the work method

Use safety blocks, etc.



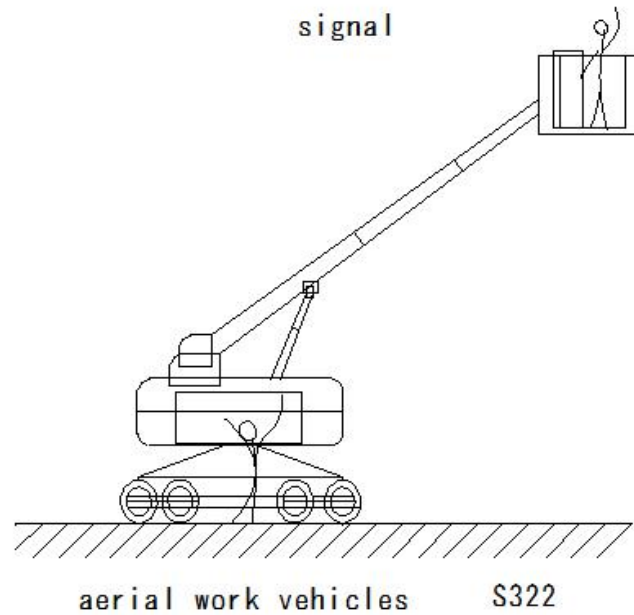
(S637) Aerial work vehicles

(S637) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Decide on a signal and designate a signal person



(S638) Aerial work vehicles

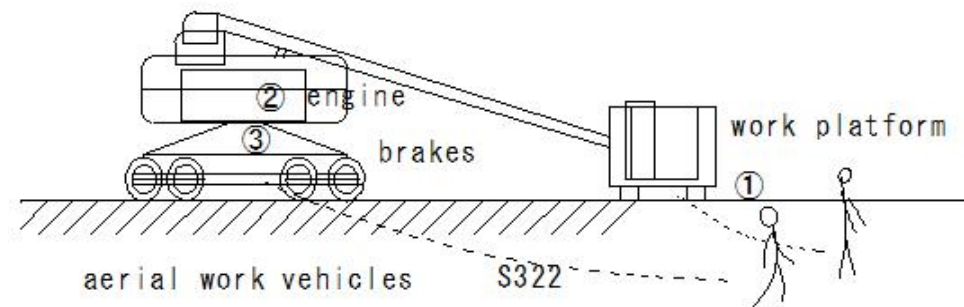
(S638) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Measures to be taken when the driver leaves the driving position

- ① Place the work platform at the lowest lowering position
- ② Stop the engine
- ③ Be sure to apply the brakes



(S639) Aerial work vehicles

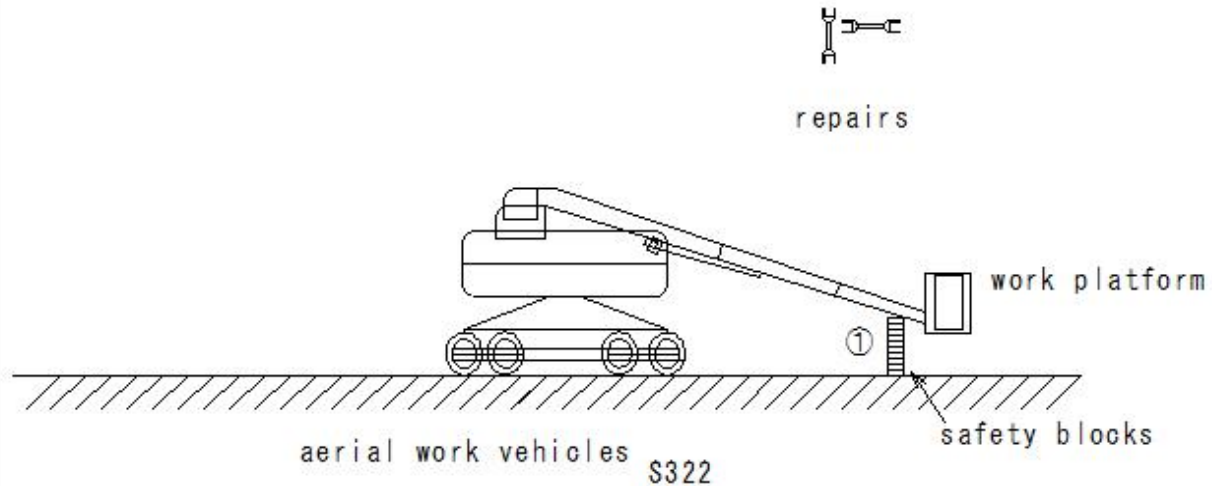
(S639) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Prevent dangers caused by the descent of the boom, etc.

- ① Use safety blocks when repairing or inspecting



(S640) Aerial work vehicles

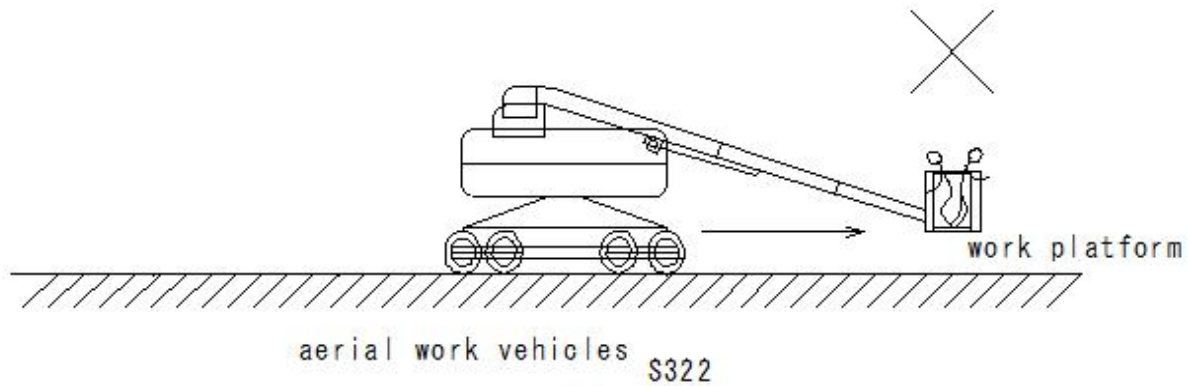
(S640) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Limits on boarding the work platform, etc.

Do not allow workers to ride on the work platform when driving



(S641) Aerial work vehicles

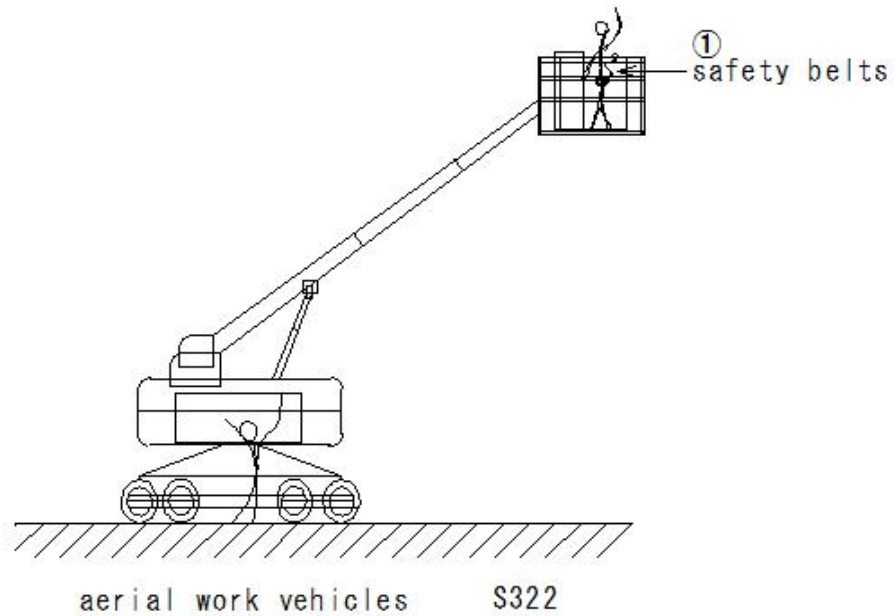
(S641) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Use of safety belts

① Use safety belts on the work platform



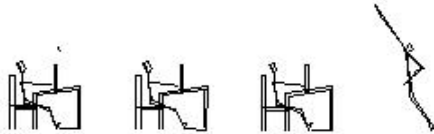
(S642) Aerial work vehicles

(S642) Aerial work vehicles

Safe work with aerial work vehicles

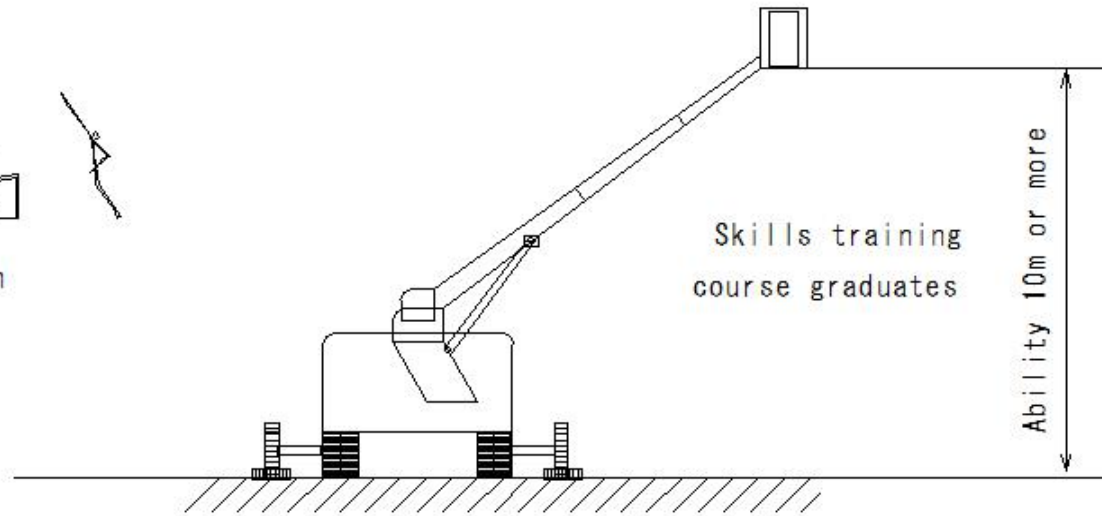
Driving qualifications

Aerial work vehicles



Less than 10m-Special Education

Special training graduates



Skills training
course graduates

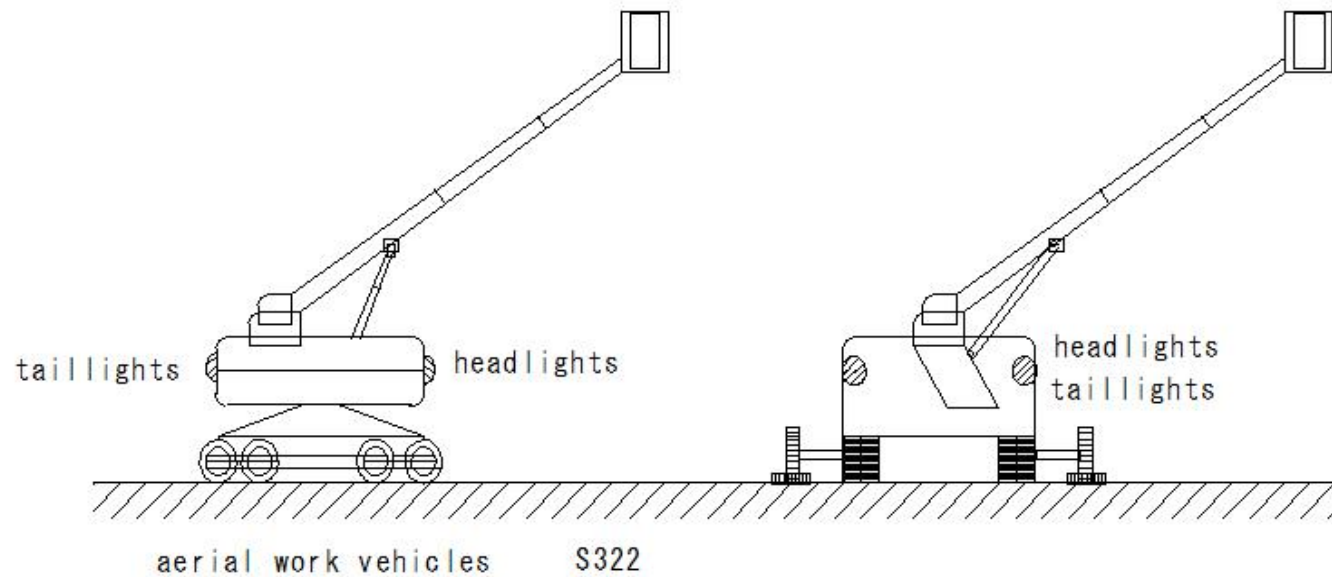
(S643) Aerial work vehicles

(S643) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Safety work with high-altitude work vehicles



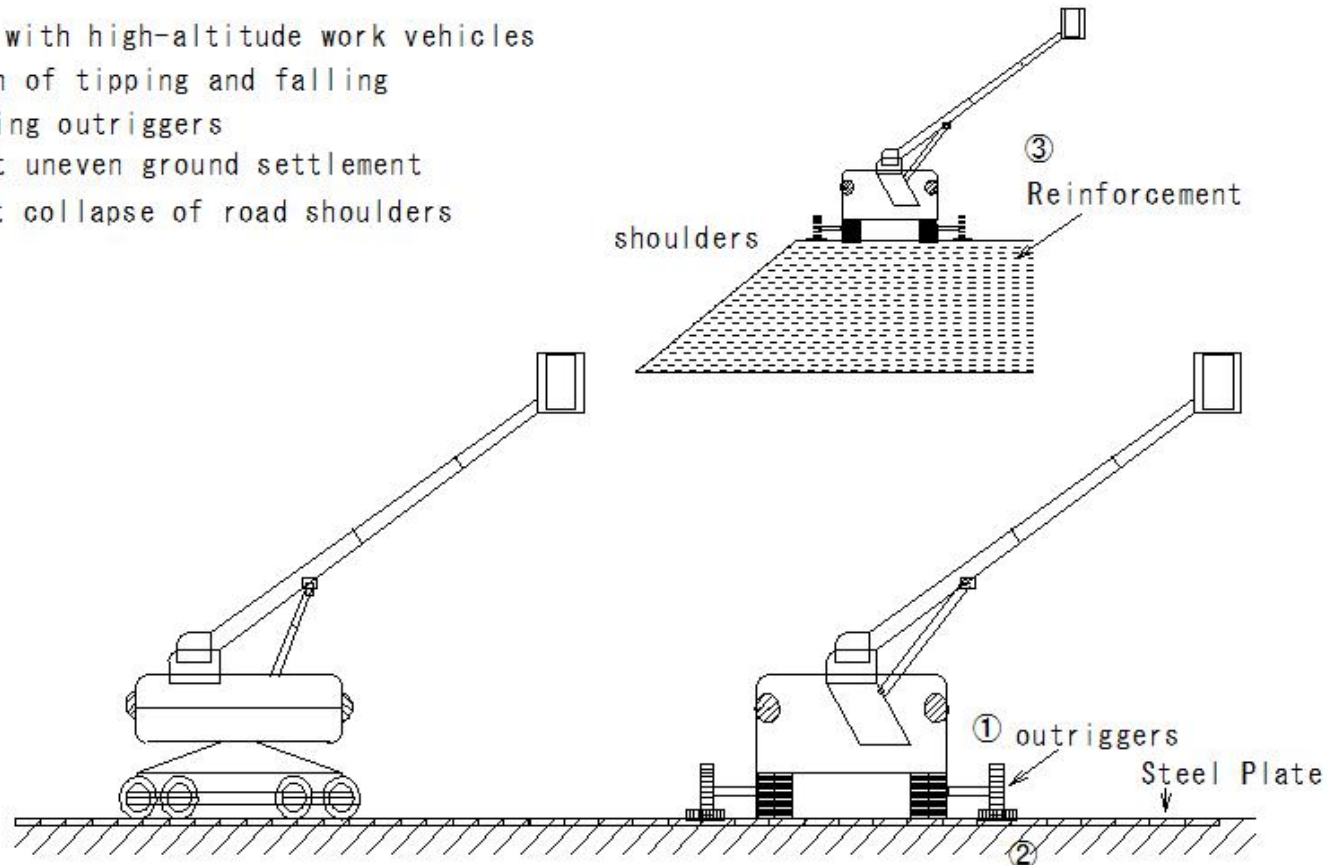
(S644) Aerial work vehicles

(S644) Aerial work vehicles

Safety work with high-altitude work vehicles

Prevention of tipping and falling

- ① Extending outriggers
- ② Prevent uneven ground settlement
- ③ Prevent collapse of road shoulders



aerial work vehicles S322

(S645) Aerial work vehicles

(S645) Aerial work vehicles

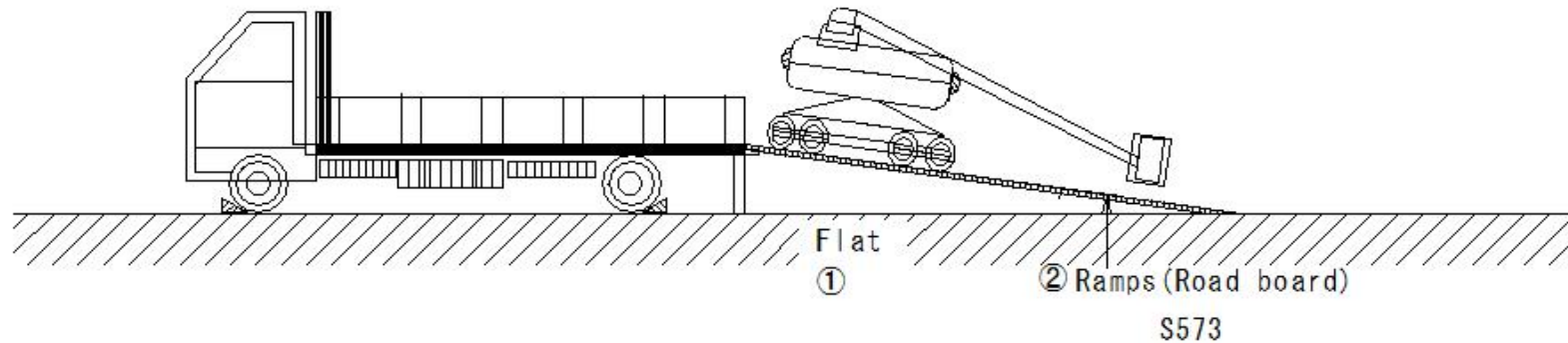
Safe work with aerial work vehicles

Aerial work vehicles

Safety work with high-altitude work vehicles

Transportation

- ① Loading and unloading should be done on flat, solid ground
- ② The ramp should be of sufficient length, width and strength,
and securely attached with an appropriate gradient



aerial work vehicles
S322

(S646) Aerial work vehicles

(S646) Aerial work vehicles

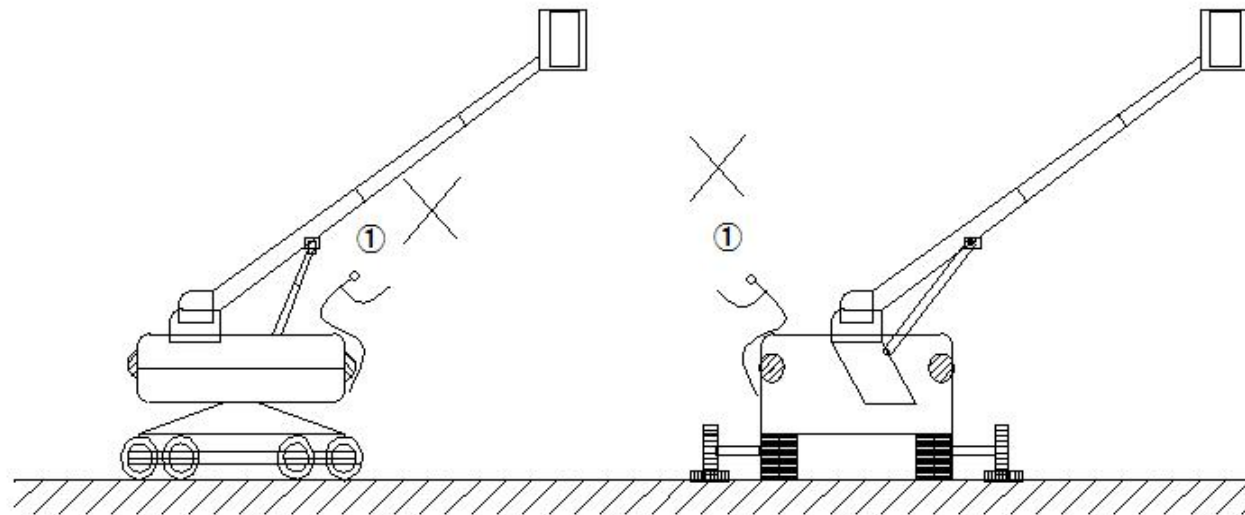
Safe work with aerial work vehicles

Aerial work vehicles

Safety work with high-altitude work vehicles

Boarding restrictions

① No riding anywhere other than the passenger seat and work floor



aerial work vehicles S322

(S647) Aerial work vehicles

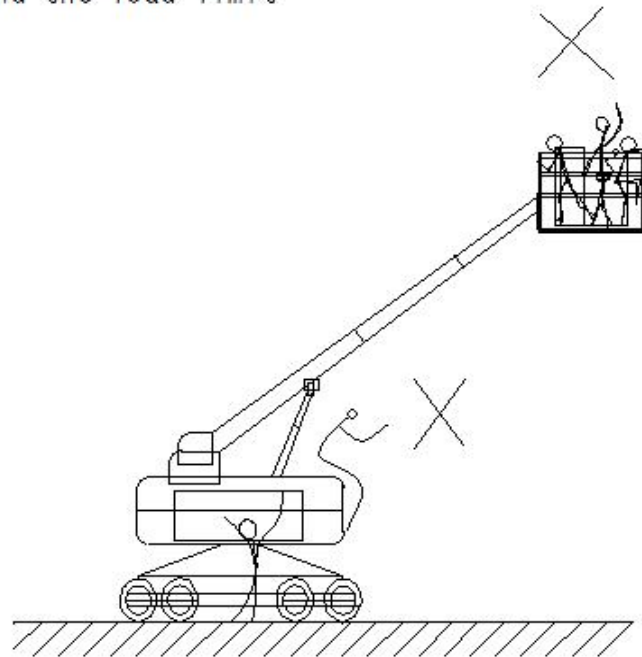
(S647) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Use restrictions

① Loading Do not use beyond the load limit



aerial work vehicles S322

(S648) Aerial work vehicles

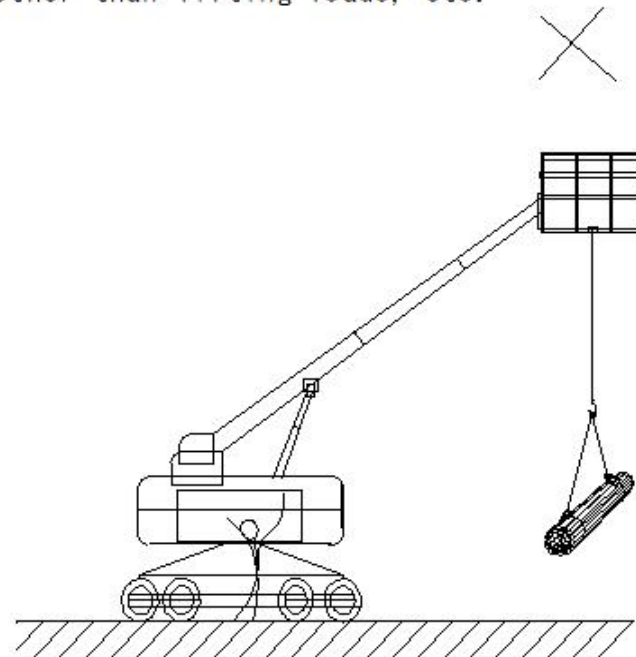
(S648) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Restrictions on use other than the main purpose

① Do not use for purposes other than lifting loads, etc.



aerial work vehicles S322

(S649) Aerial work vehicles

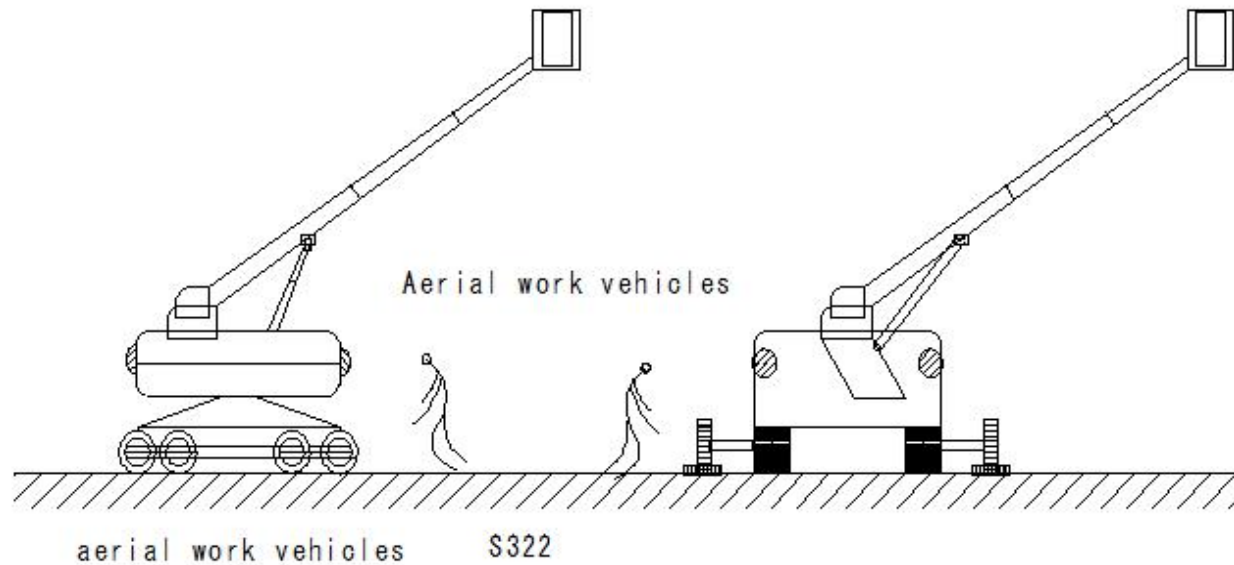
(S649) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Periodic self-inspection

- ① Annual inspection for a period not exceeding one year
- ② Monthly inspection for a period not exceeding one month
- ③ Annual inspection is a specific self-inspection, and an inspection mark is affixed



(S650) Aerial work vehicles

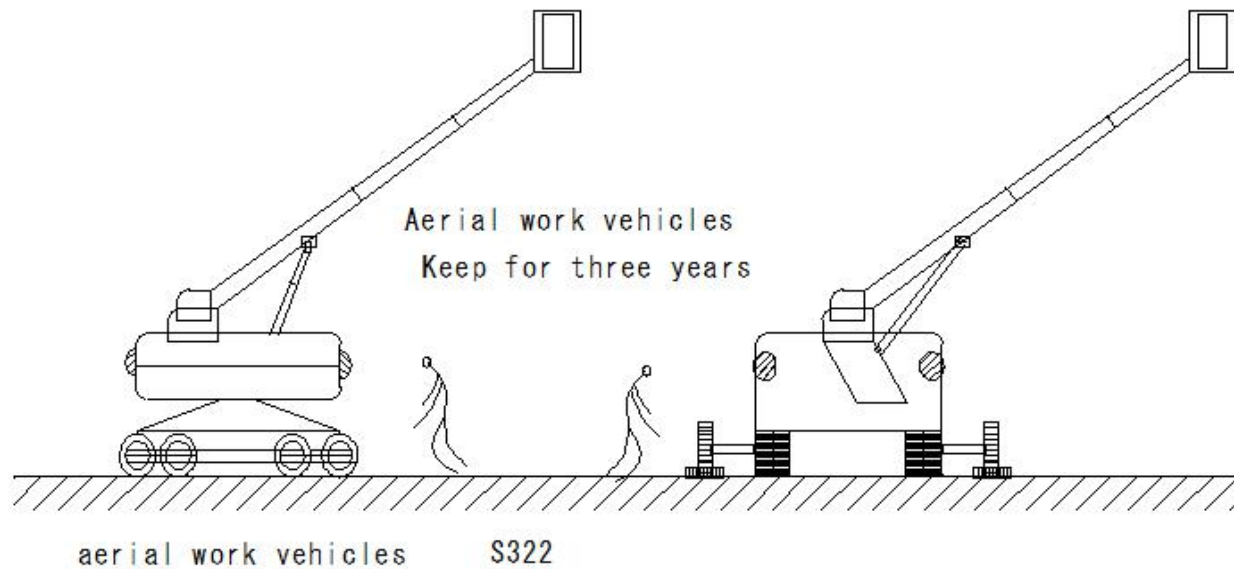
(S650) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Records of periodic self-inspection

Keep for three years



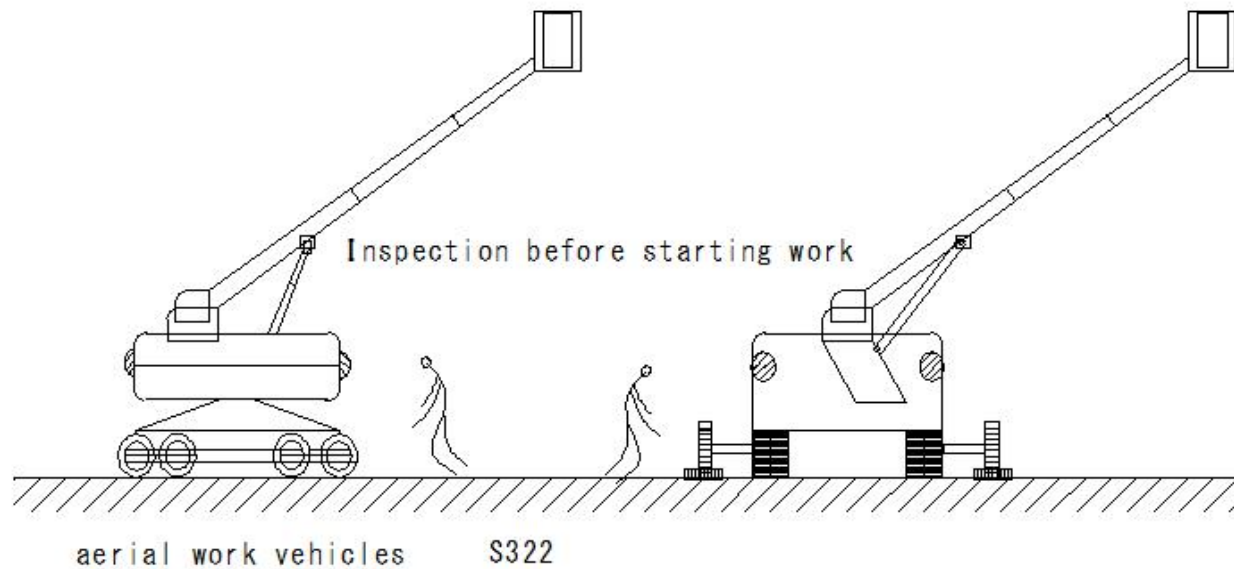
(S651) Aerial work vehicles

(S651) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Inspection before starting work



(S652) Aerial work vehicles

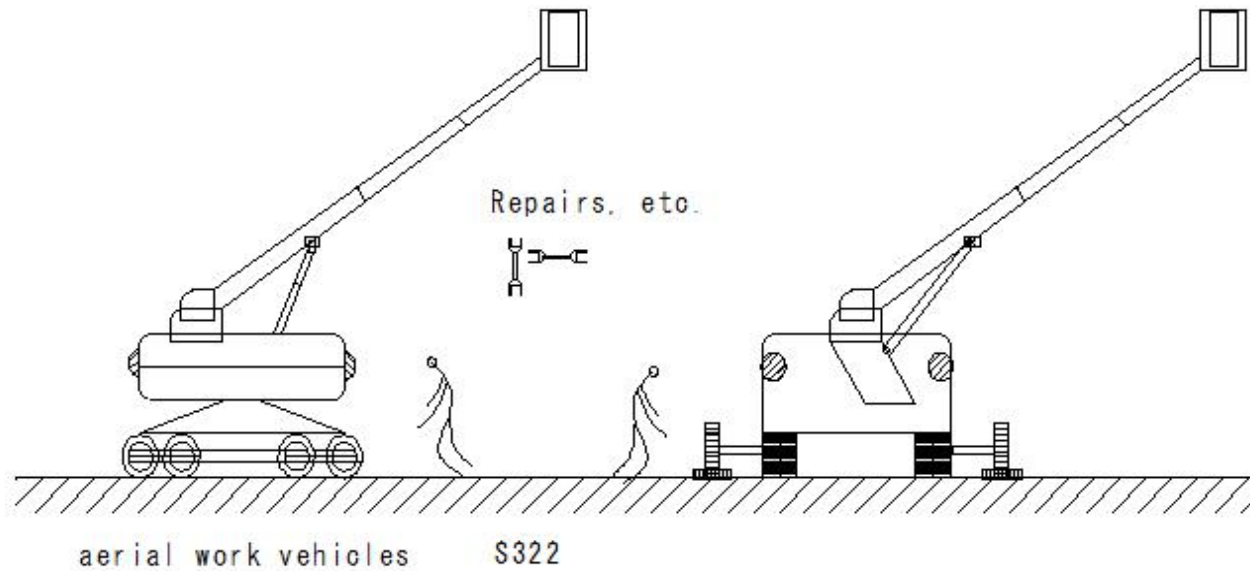
(S652) Aerial work vehicles

Safe work with aerial work vehicles

Aerial work vehicles

Repairs, etc.

In case of any abnormality is found, repair it immediately



(S653) Pile drivers, Pile extractors, and Boring machines

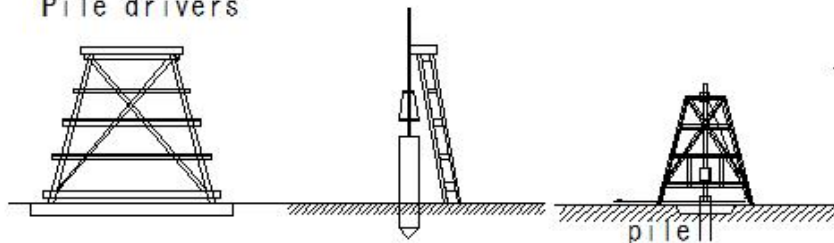
(S653) Pile drivers, Pile extractors, and Boring machines

Safety work for pile drivers, pile extractors, and boring machines

Employer → Designation: Assembly, dismantling, modification,
and movement (define and publicize work methods and procedures)

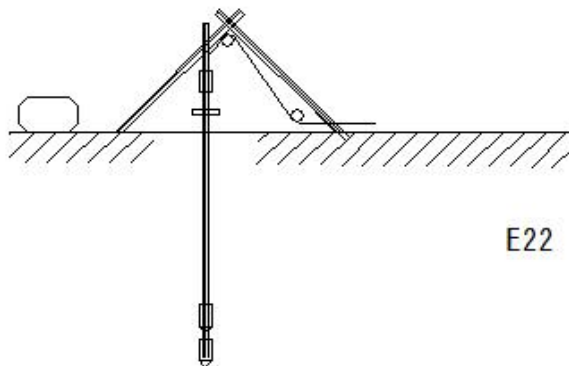
Work supervisor → Worker → Assembly work completed → Start of use

Pile drivers



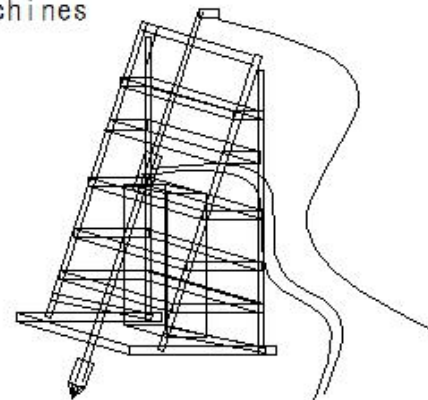
M68
F182

Standard penetration test



E22

Boring machines



(S654) Pile drivers, Pile extractors, and Boring machines

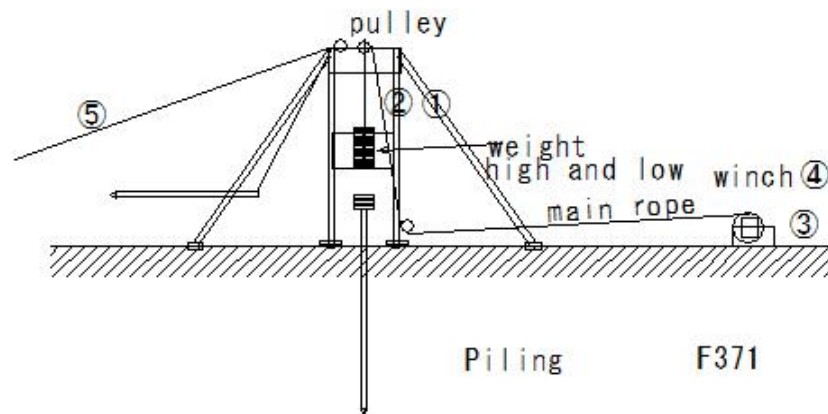
(S654) Pile drivers, Pile extractors, and Boring machines

Safety work for pile drivers, pile extractors, and boring machines

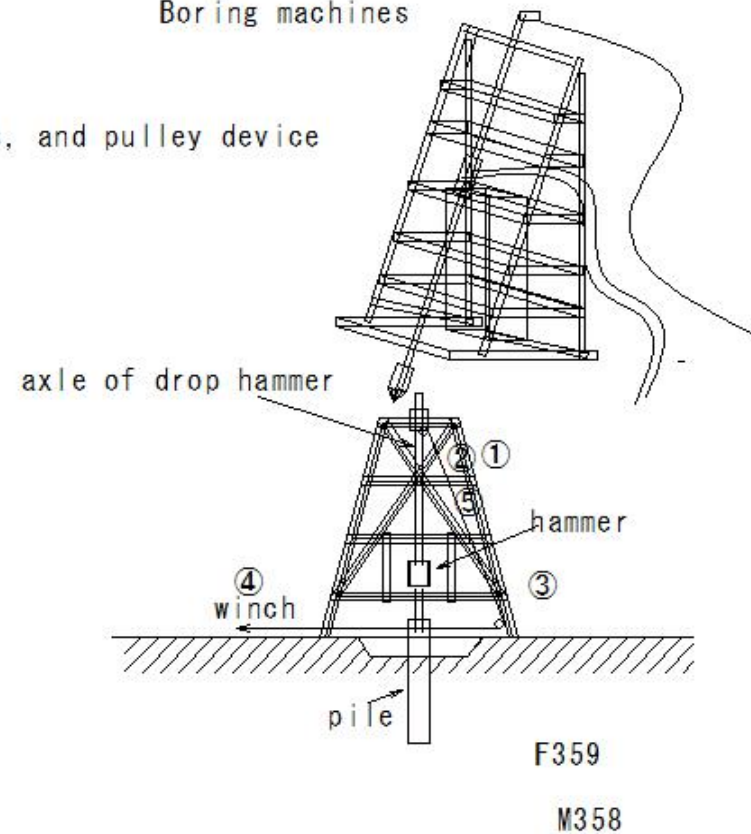
In case of assembled

Inspection

- ① Check for looseness or damage to fastening parts
- ② Installation status of hoisting wire rope, sheaves, and pulley device
- ③ Function of brakes and ratchet devices
- ④ Installation status of winch
- ⑤ How to take back and how fixed



Boring machines



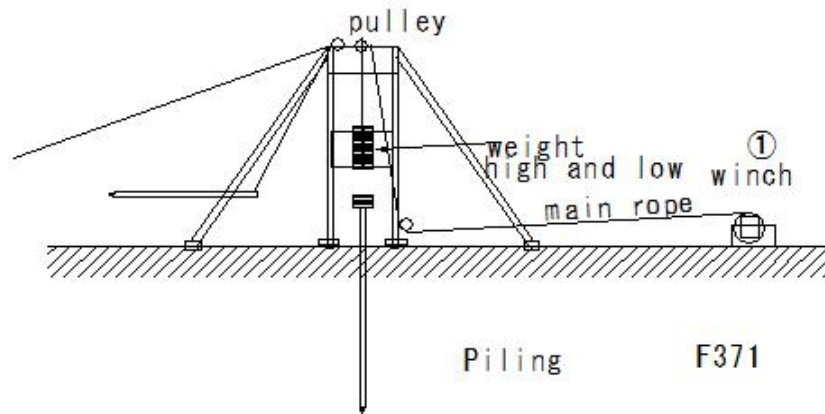
(S655) Pile drivers, Pile extractors, and Boring machines

(S655) Pile drivers, Pile extractors, and Boring machines

Safety work for pile drivers, pile extractors, and boring machines

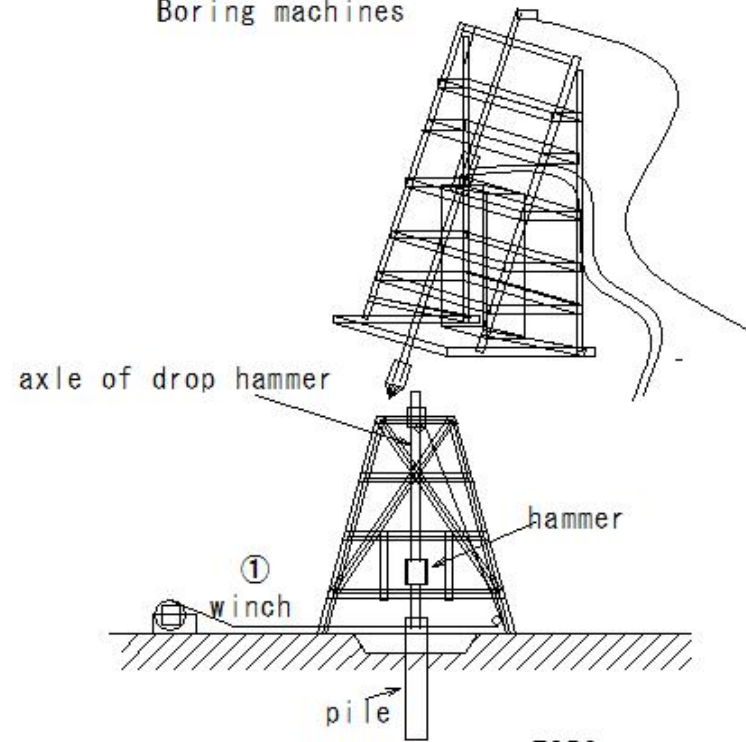
① Measures to take when winding is irregular

Boring machines



Piling

F371



F359

M358

(S656) Pile drivers, Pile extractors, and Boring machines

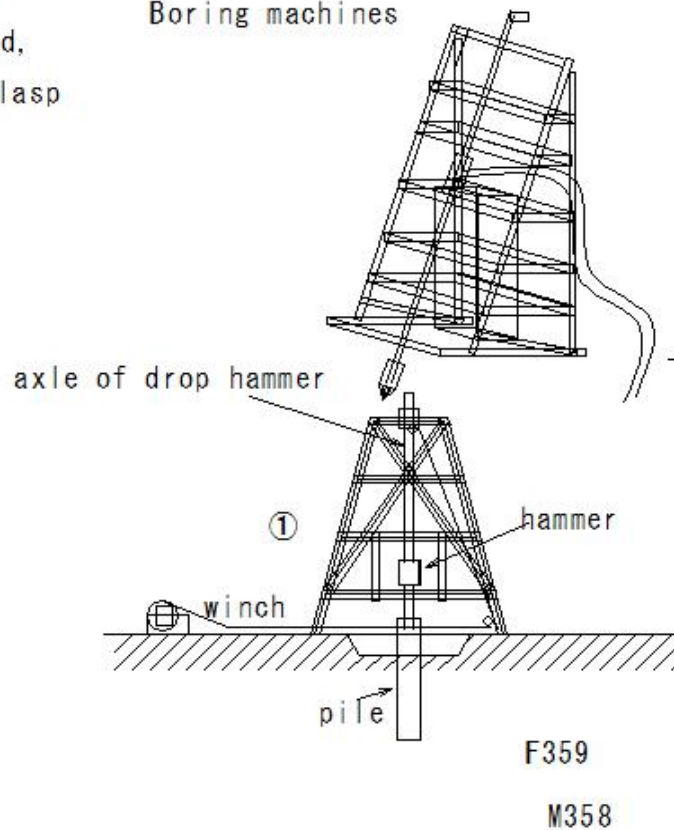
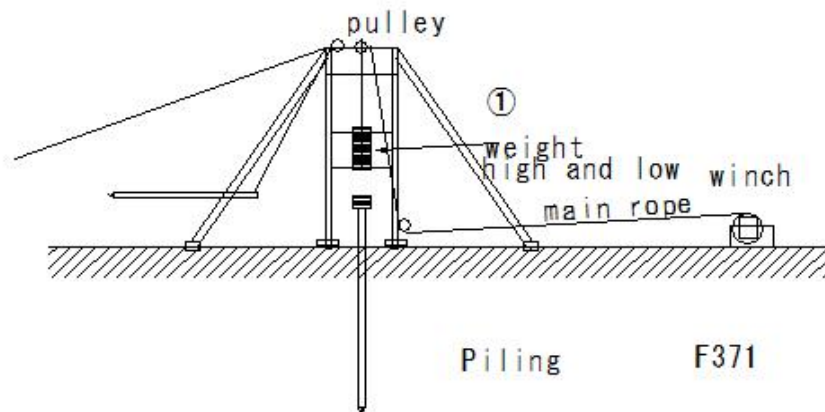
(S656) Pile drivers, Pile extractors, and Boring machines

Safety work for pile drivers, pile extractors, and boring machines

Measures to take when the hoisting device is stopped

- ① In case of stopping the machine with a load applied,
use the pawl and brake with a clasp

Boring machines



(S657) Pile drivers, Pile extractors, and Boring machines

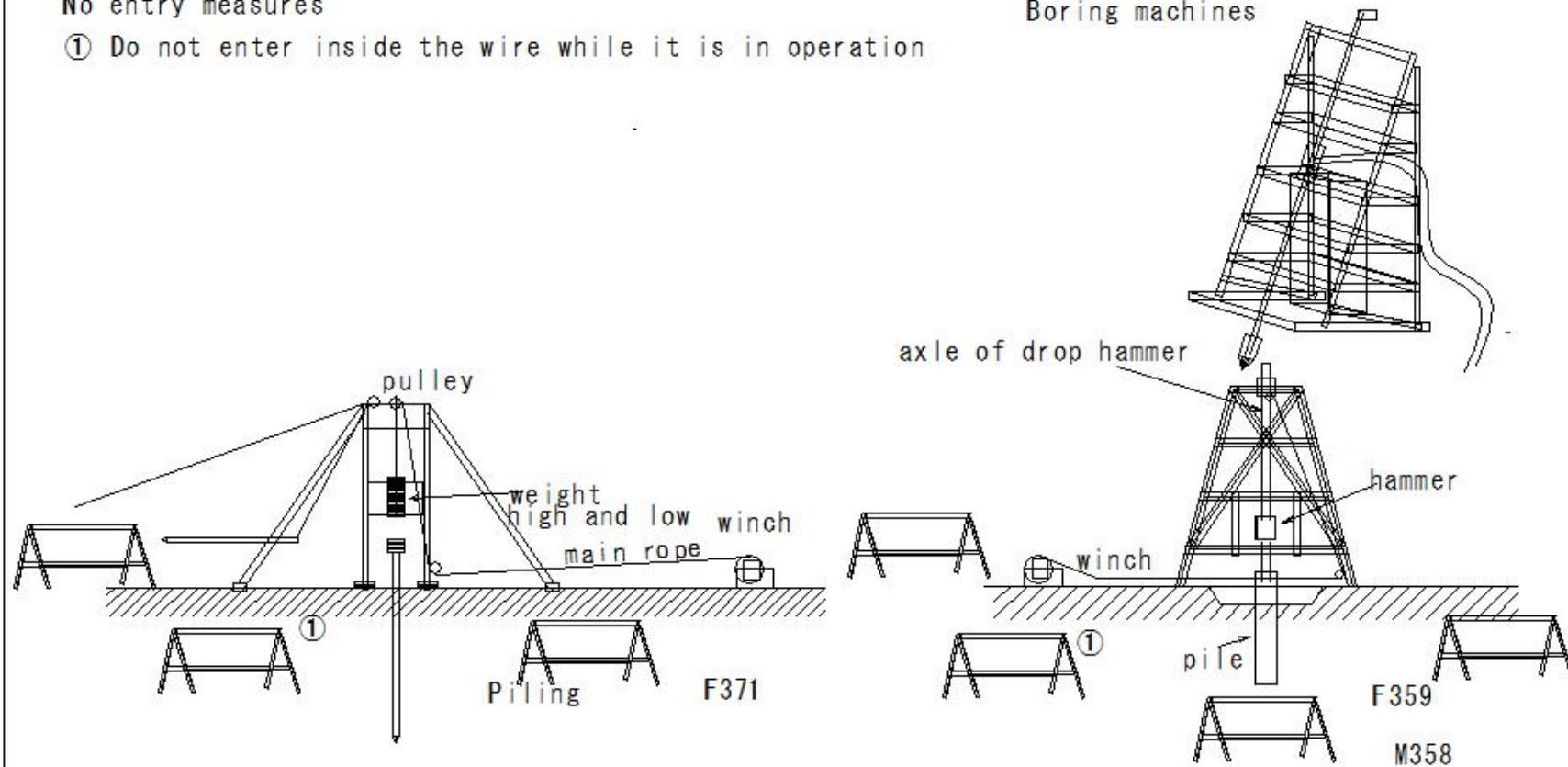
(S657) Pile drivers, Pile extractors, and Boring machines

Safety work for pile drivers, pile extractors, and boring machines

No entry measures

- ① Do not enter inside the wire while it is in operation

Boring machines



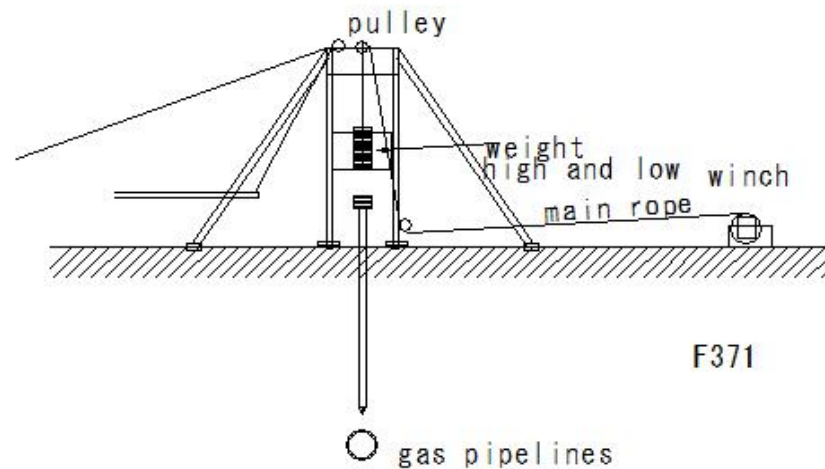
(S658) Pile drivers, Pile extractors, and Boring machines

(S658) Pile drivers, Pile extractors, and Boring machines

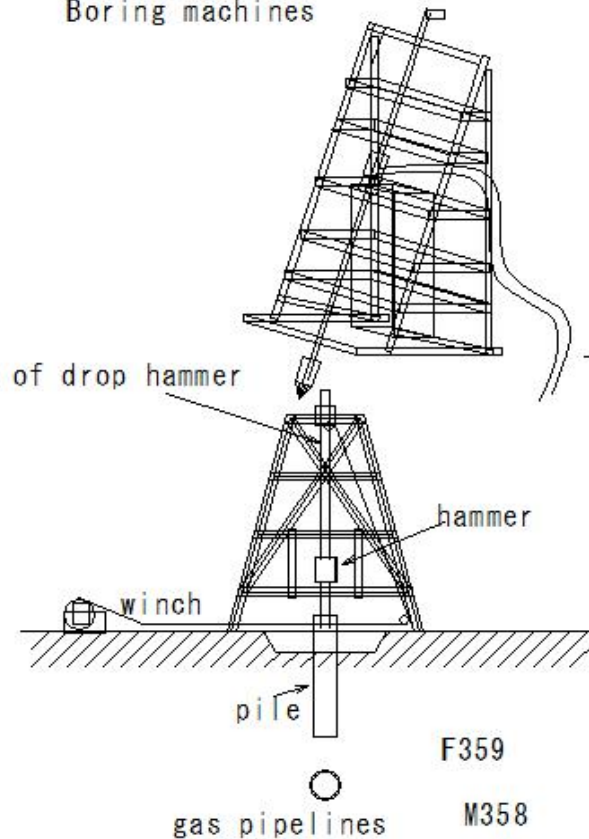
Safety work for pile drivers, pile extractors, and boring machines

Measures to prevent damage to gas pipelines, etc.

Boring machines



Piling



(S659) Pile drivers, Pile extractors, and Boring machines

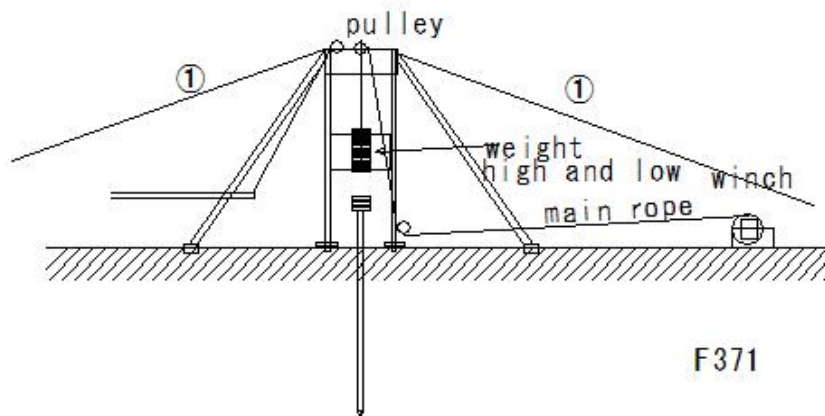
(S659) Pile drivers, Pile extractors, and Boring machines

Safety work for pile drivers, pile extractors, and boring machines

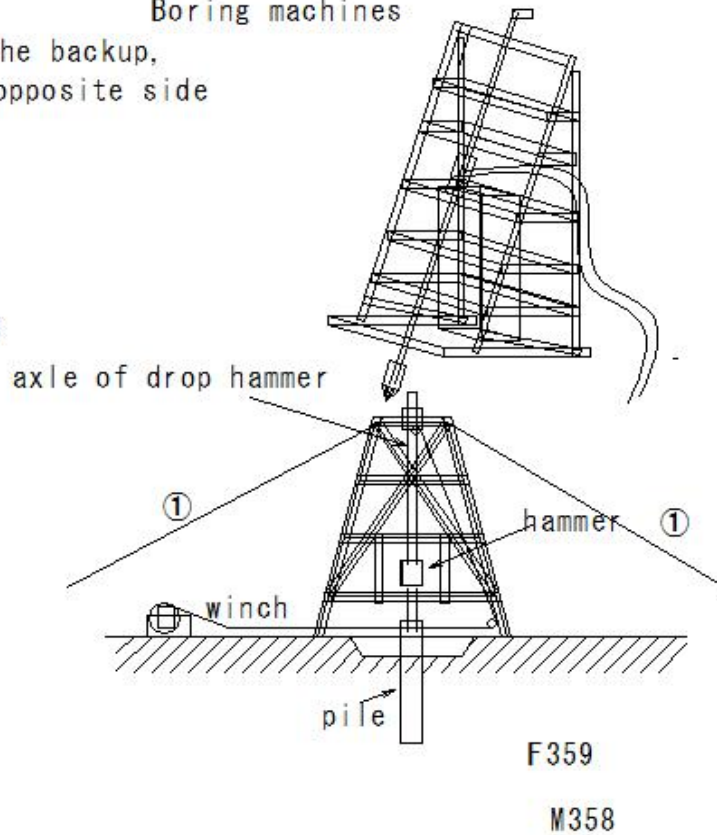
Moving pile drivers, etc.

- ① In case of moving a pile driver as instructed in the backup,
use a tension block, winch, etc. to brake from the opposite side

Boring machines



Piling



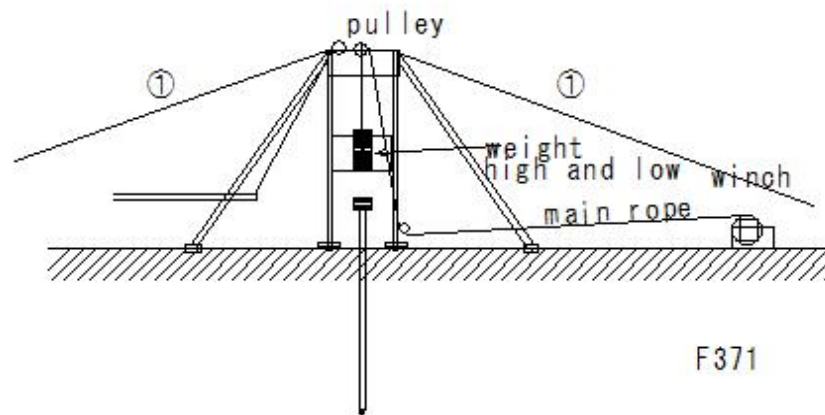
(S660) Pile drivers, Pile extractors, and Boring machines

(S660) Pile drivers, Pile extractors, and Boring machines

Safety work for pile drivers, pile extractors, and boring machines

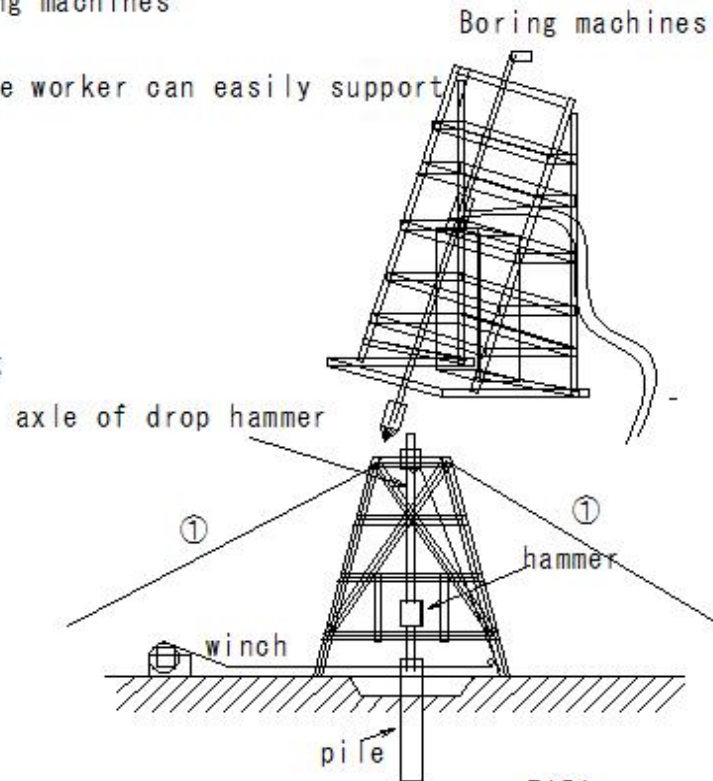
Measures to take when loosening the bracing wire

- ① Do not apply a load that exceeds the limit that the worker can easily support



F371

Piling



F359

M358

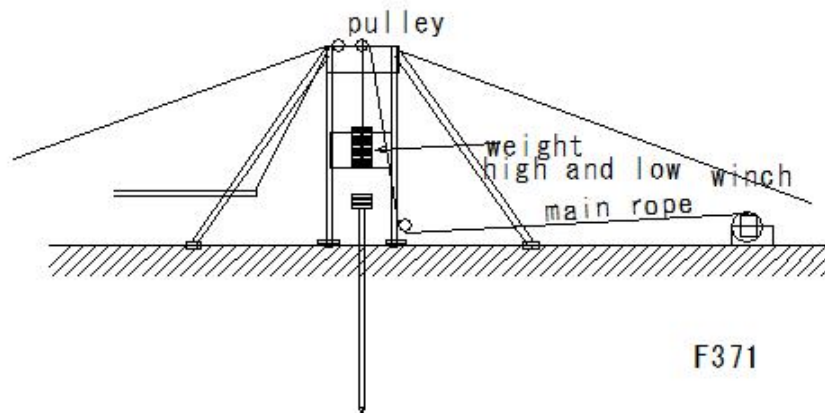
(S661) Pile drivers, Pile extractors, and Boring machines

(S661)Pile drivers, Pile extractors, and Boring machines

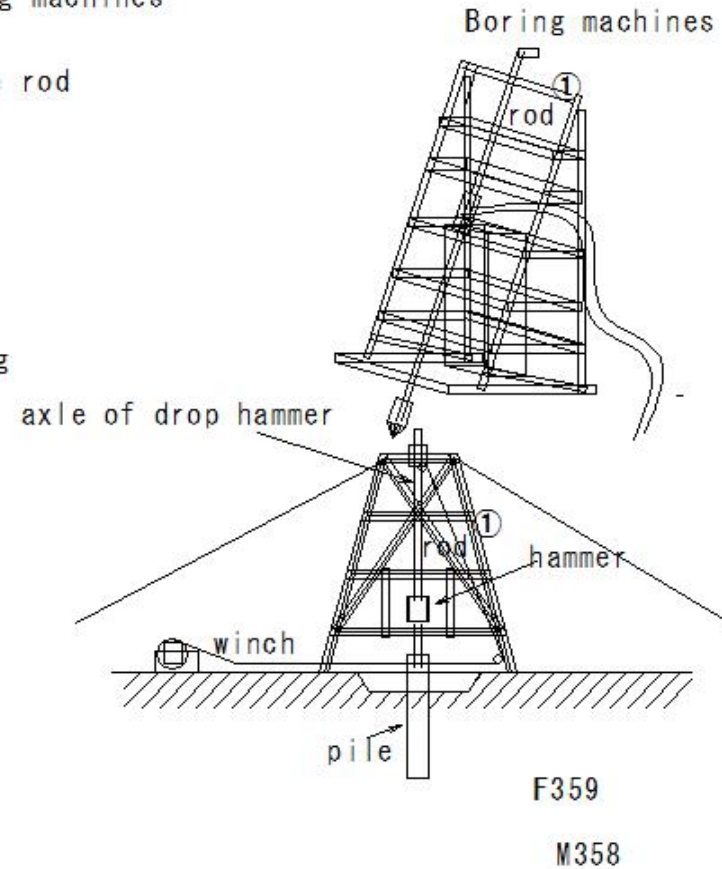
Safe work with pile drivers, pile extractors, and boring machines

Measures to take in case of attaching the rod

① Be sure to cut off the power to rotate and hold the rod



Piling



Boring machines

(S662) Pile drivers, Pile extractors, and Boring machines

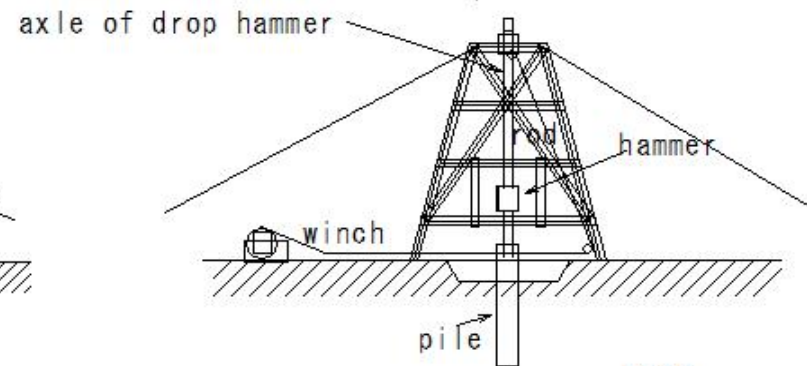
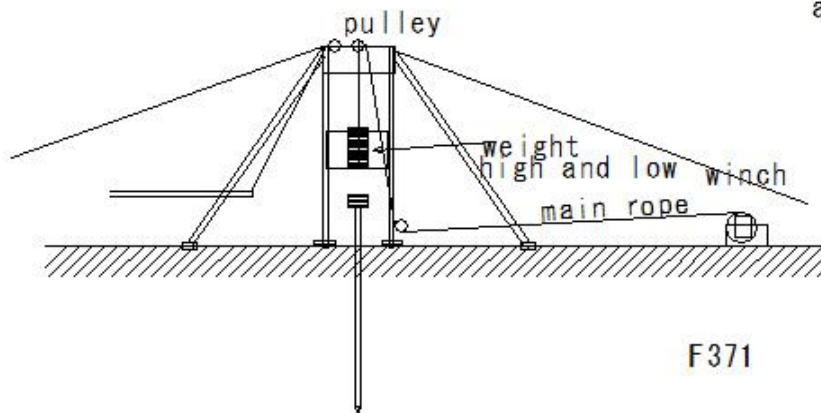
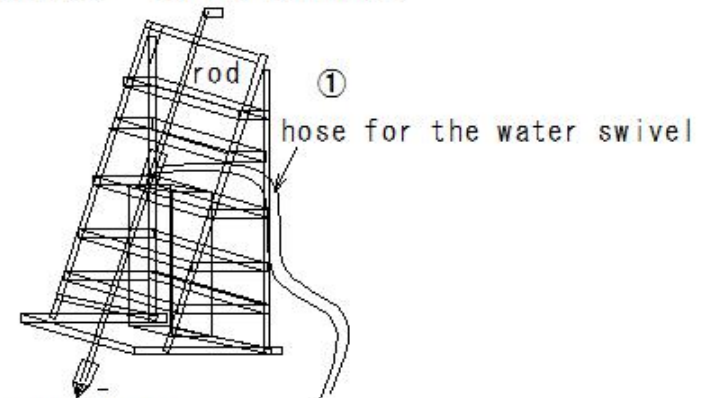
(S662) Pile drivers, Pile extractors, and Boring machines

Safe work with pile drivers, pile extractors, and boring machines

Securing the hose for the water swivel

① Secure to a tower, etc.

Boring machines



F359

M358

(S663) Pile drivers, Pile extractors, and Boring machines

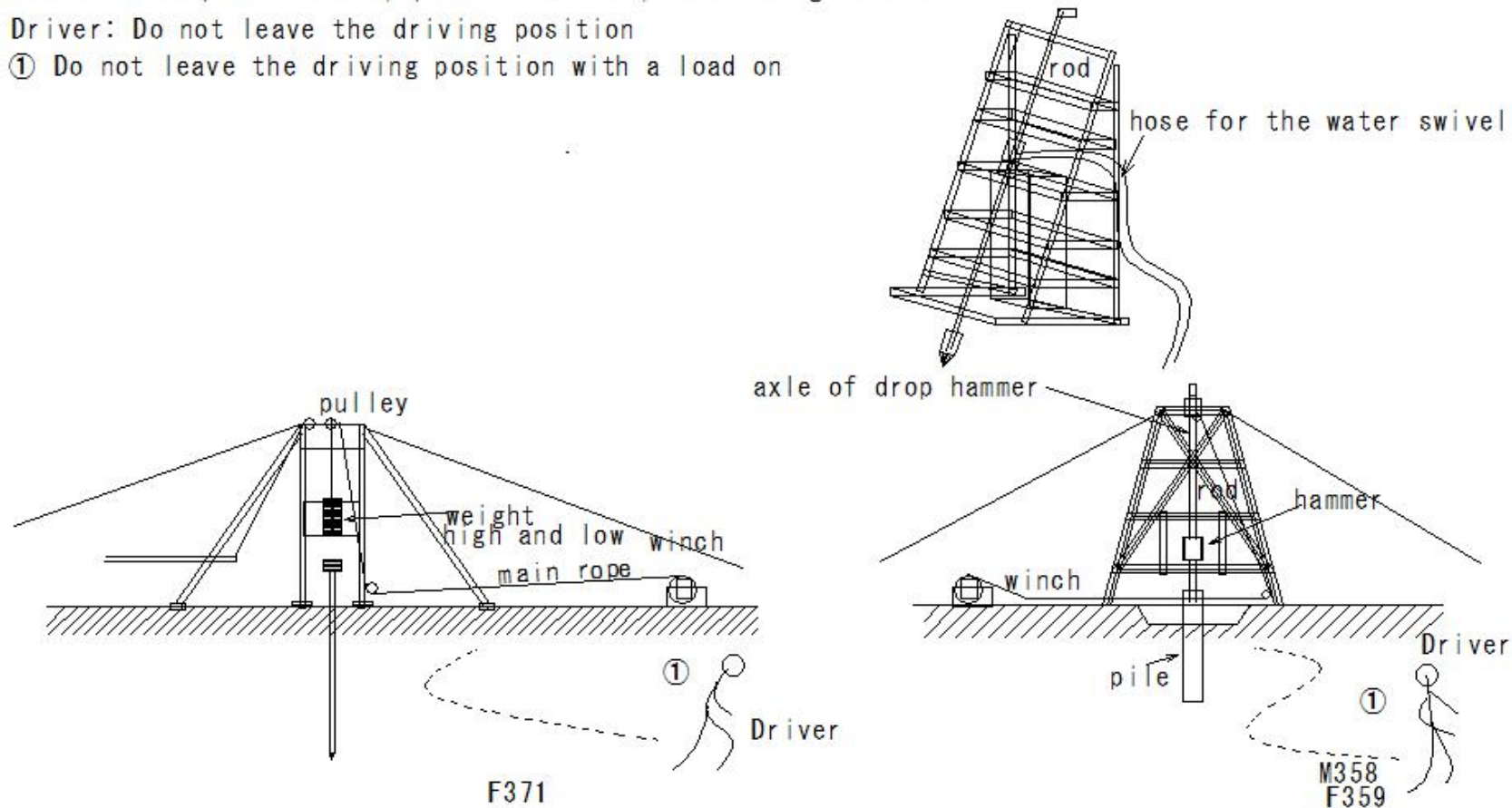
(S663) Pile drivers, Pile extractors, and Boring machines

Safe work with pile drivers, pile extractors, and boring machines

Driver: Do not leave the driving position

① Do not leave the driving position with a load on

Boring machines



(S664) Pile drivers, Pile extractors, and Boring machines

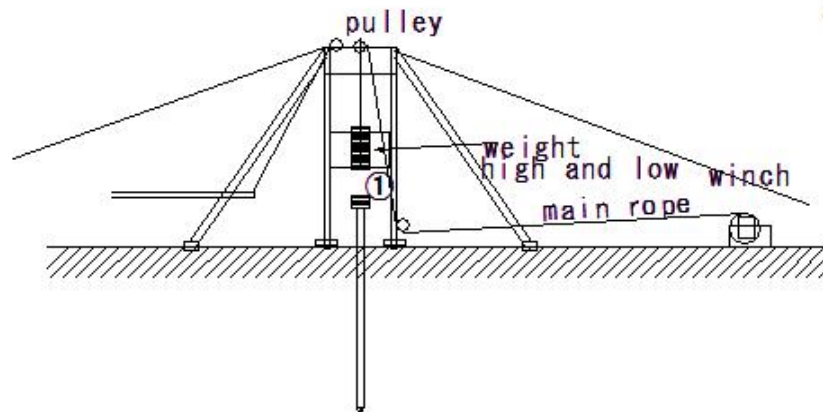
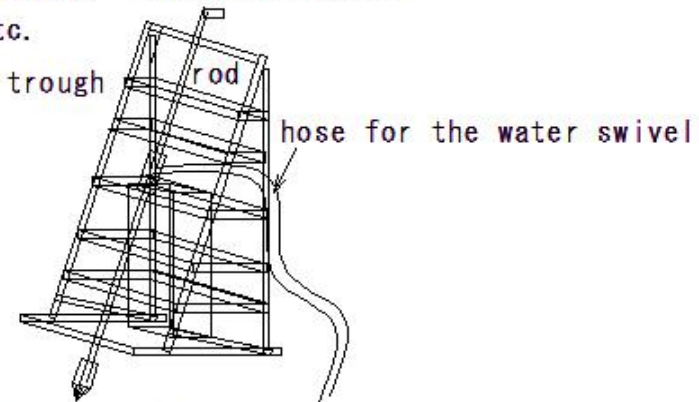
(S664) Pile drivers, Pile extractors, and Boring machines

Safe work with pile drivers, pile extractors, and boring machines

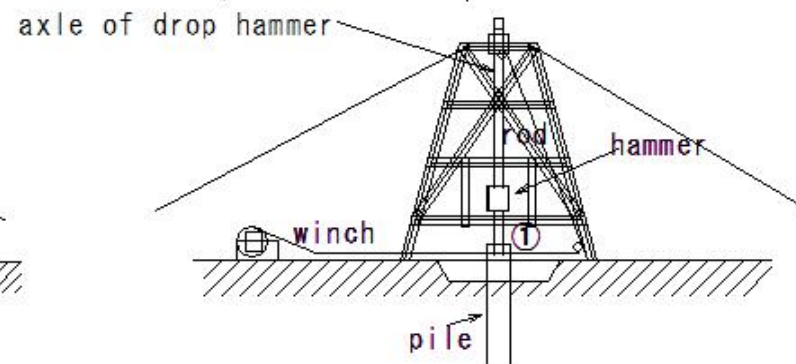
Measures to take in case of lifting sheet piles, rods, etc.

- ① Lift so that the sling is directly under the hoisting trough

Boring machines



F371



M358
F359

(S665) Pile drivers, Pile extractors, and Boring machines

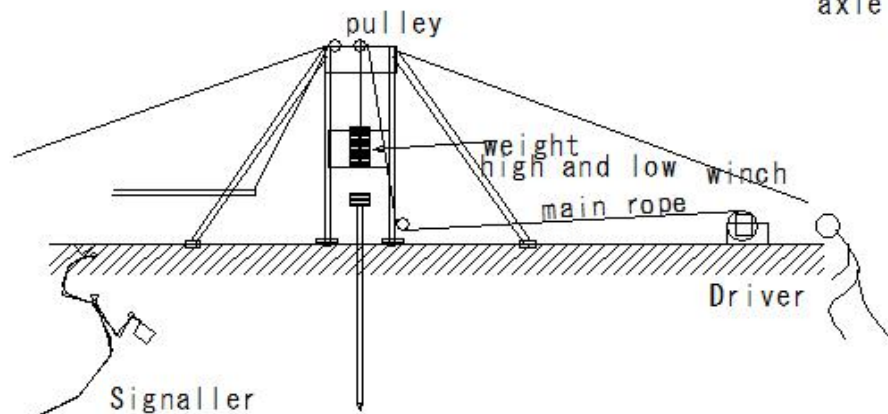
(S665) Pile drivers, Pile extractors, and Boring machines

Safe work with pile drivers, pile extractors, and boring machines

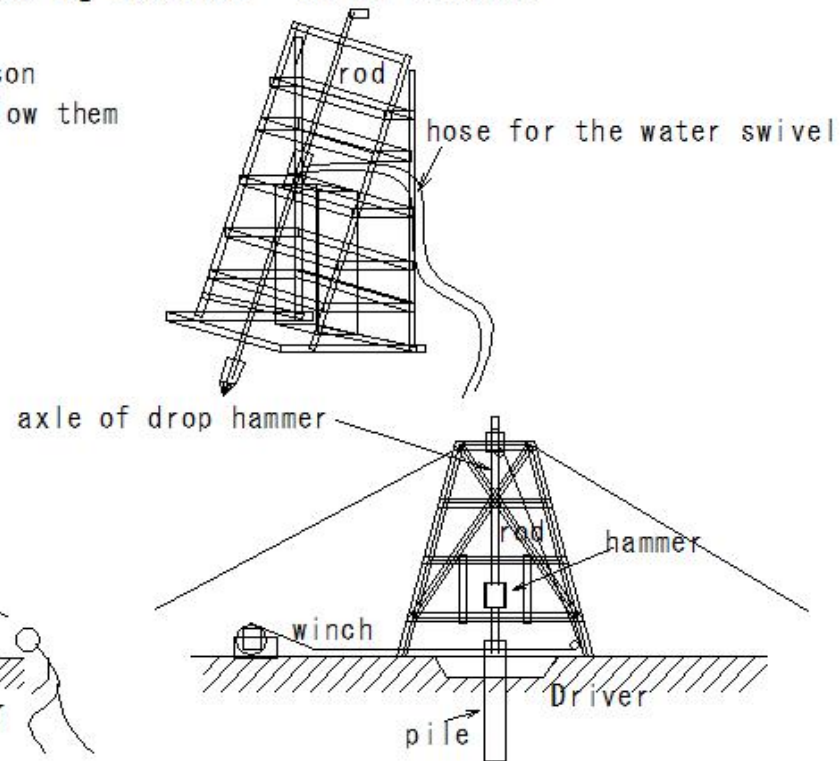
Boring machines

Signals

- ① Determine and use certain signals and the person who will give them, and the operator must follow them



F371



M358
F359

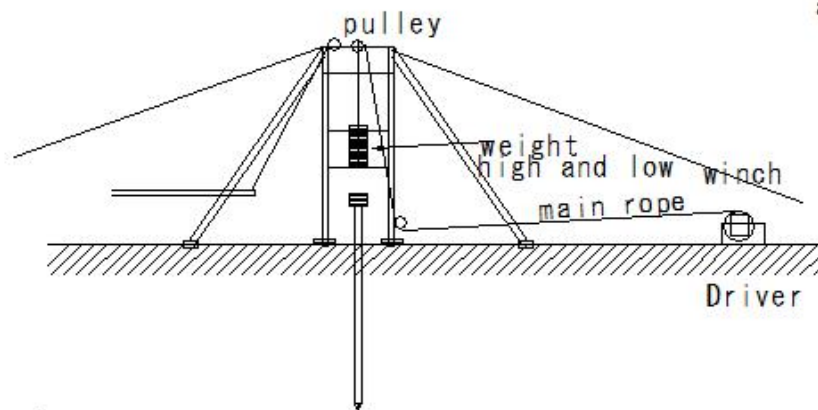
(S666) Pile drivers, Pile extractors, and Boring machines

(S666) Pile drivers, Pile extractors, and Boring machines

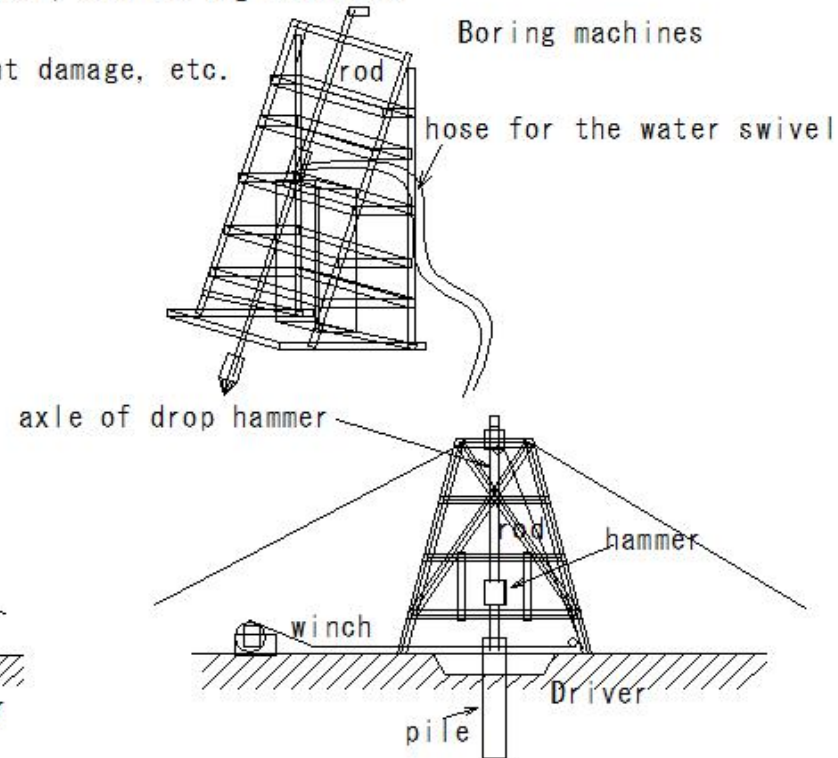
Equipment management of pile drivers, pile extractors, and boring machines

Strength

- ① Have the necessary strength and no significant damage, etc.



F371



M358
F359

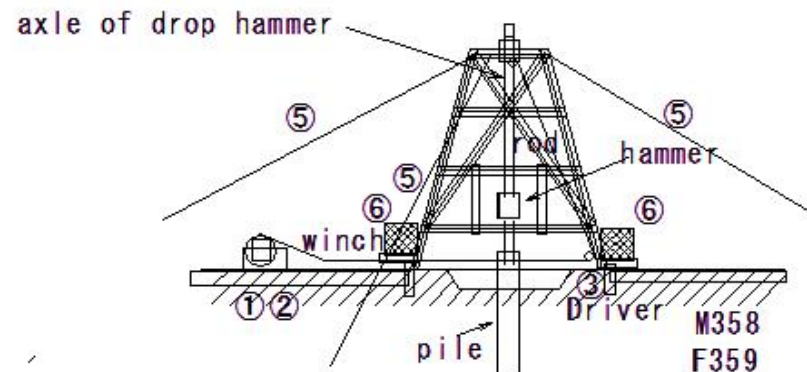
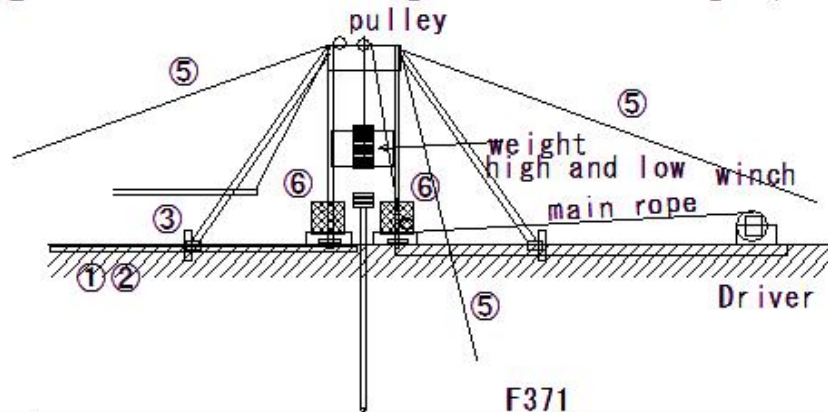
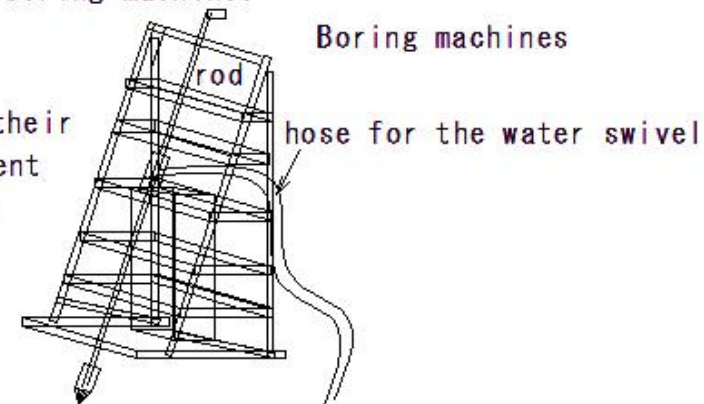
(S667) Pile drivers, Pile extractors, and Boring machines

(S667) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

Preventing collapse

- ① Use planks and angles on soft ground
- ② In case of installing on temporary structures, check their strength and reinforce if insufficient
- ③ In case of legs slide, secure with piles, wedges, etc.
- ④ In case of moving with tracks, rollers, etc., secure with ratchet
- ⑤ In case of stabilizing the top with braces only, use three or more braces, and place the brace lines at equal intervals
- ⑥ In case of stabilizing with balance weights, securely attach to the base

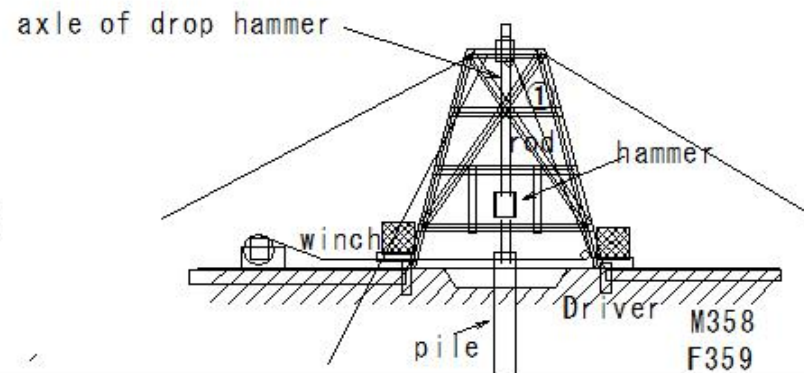
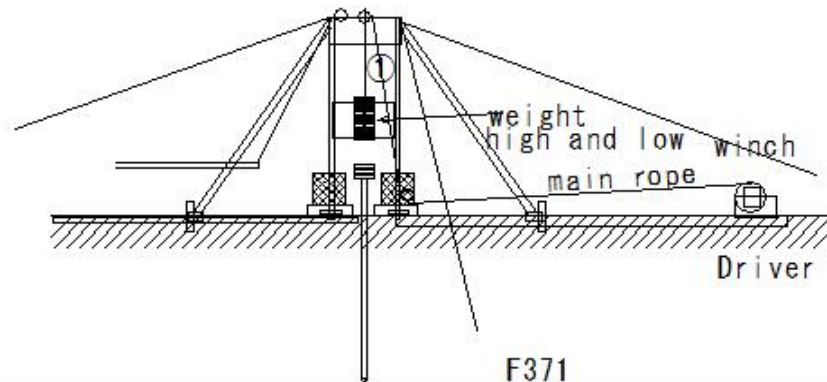
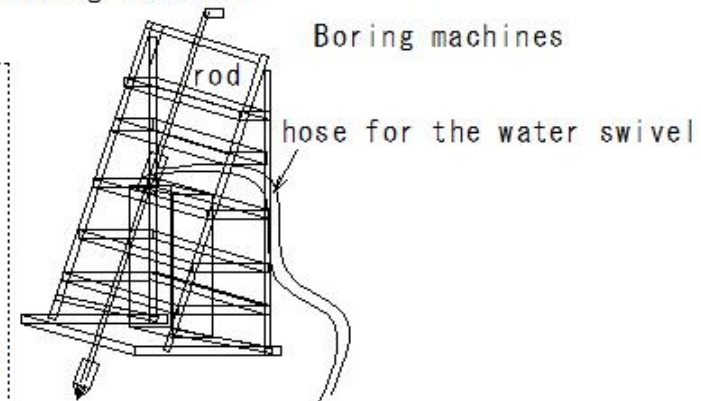
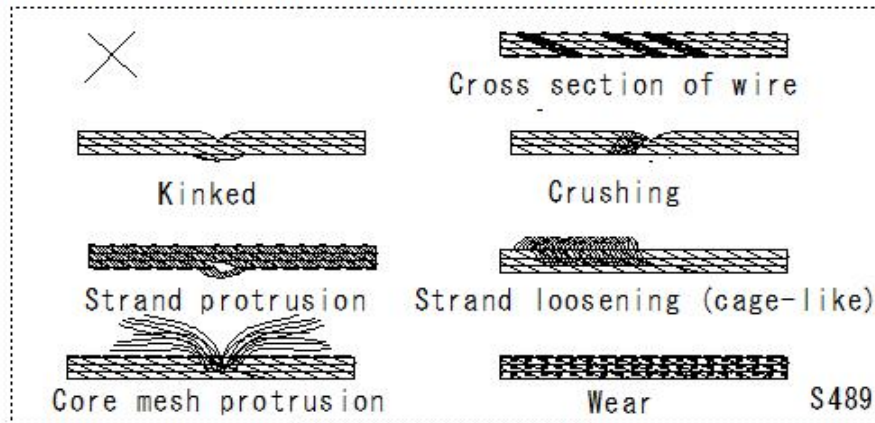


(S668) Pile drivers, Pile extractors, and Boring machines

(S668) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

① Prohibition on use of unsuitable wire ropes



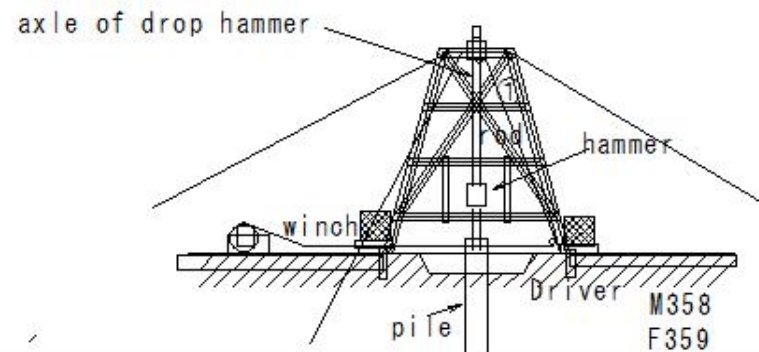
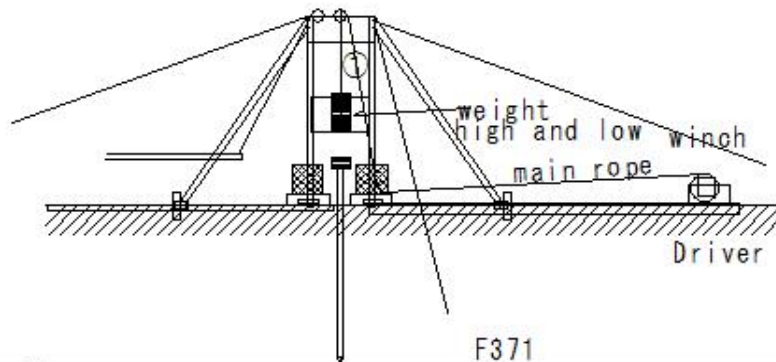
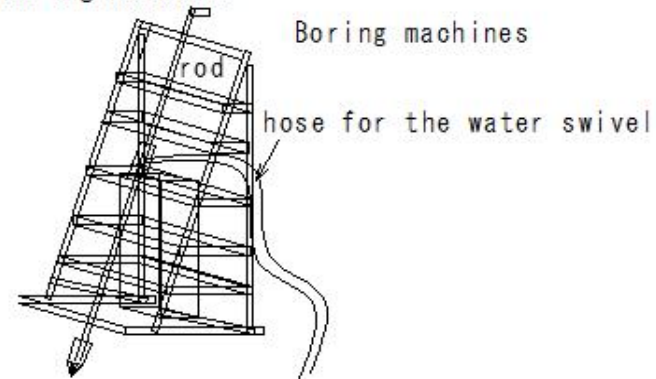
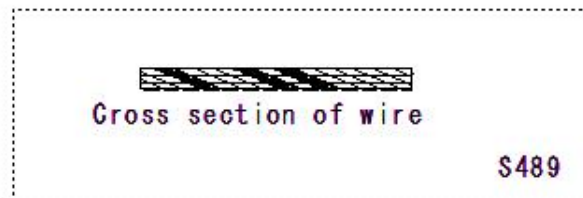
(S669) Pile drivers, Pile extractors, and Boring machines

(S669) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

Safety factor of hoisting wire rope

① Safety factor is 6 or more



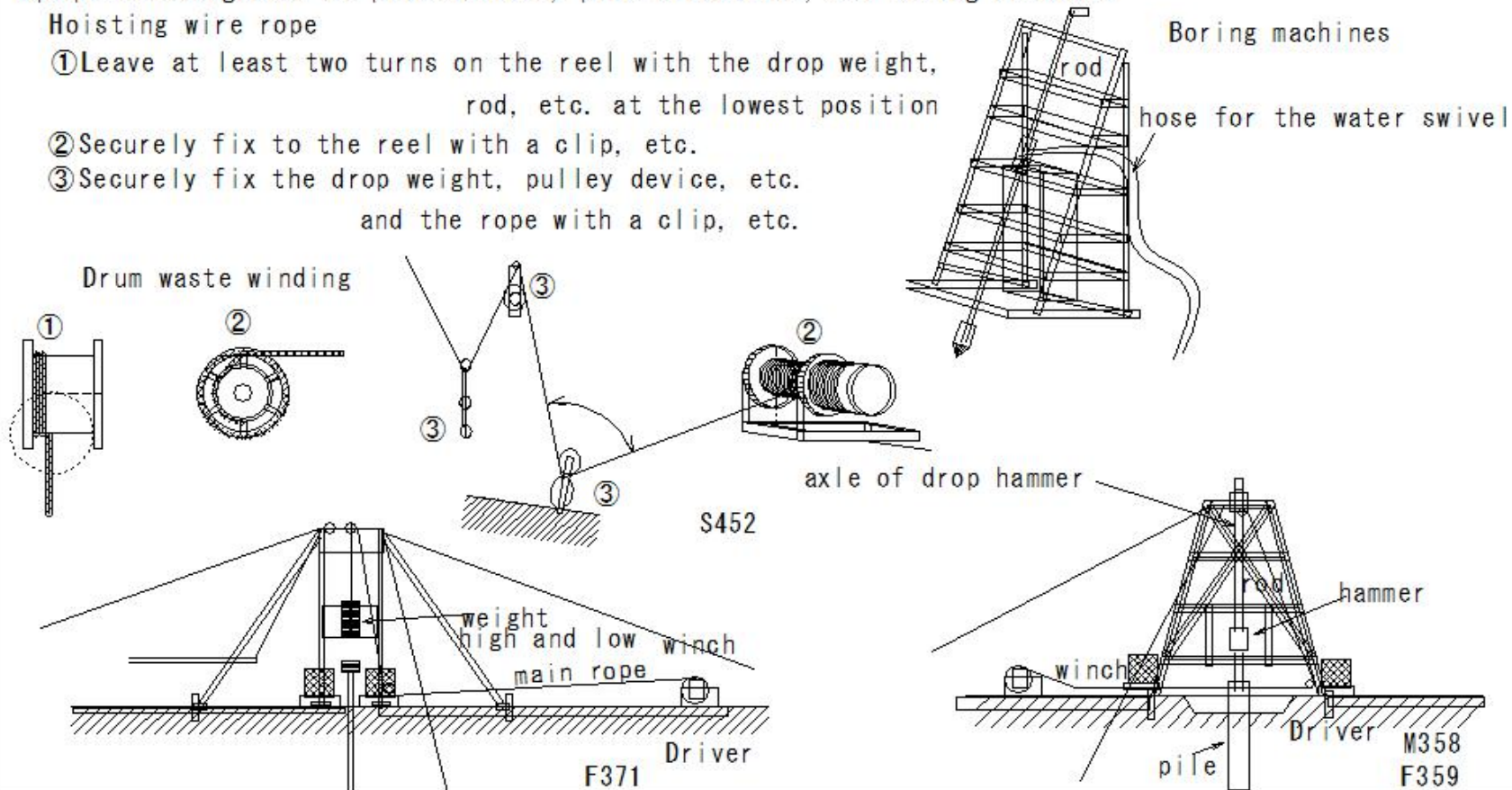
(S670) Pile drivers, Pile extractors, and Boring machines

(S670) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

Hoisting wire rope

- ① Leave at least two turns on the reel with the drop weight, rod, etc. at the lowest position
- ② Securely fix to the reel with a clip, etc.
- ③ Securely fix the drop weight, pulley device, etc. and the rope with a clip, etc.

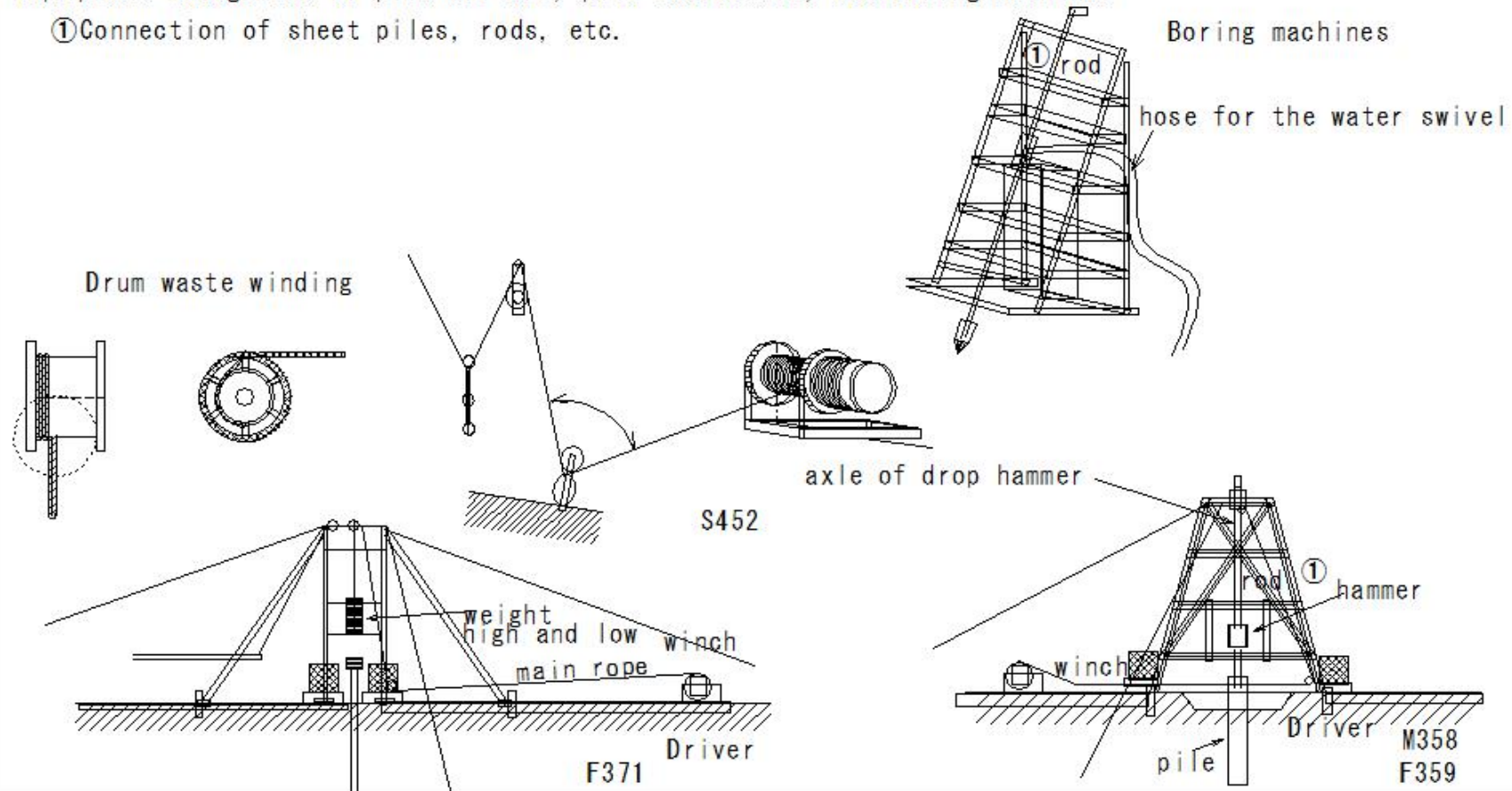


(S671) Pile drivers, Pile extractors, and Boring machines

(S671) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

① Connection of sheet piles, rods, etc.

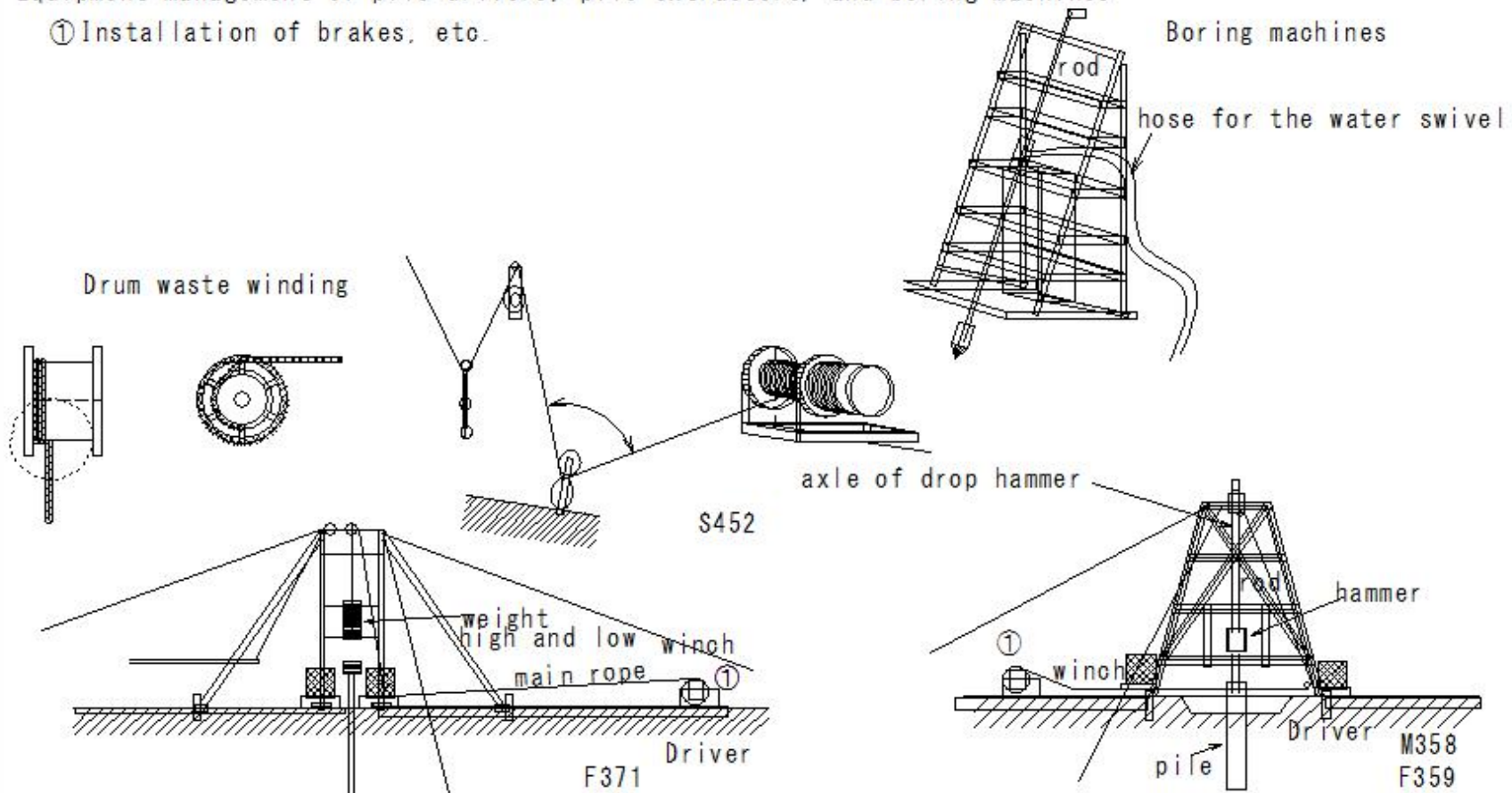


(S672) Pile drivers, Pile extractors, and Boring machines

(S672) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

① Installation of brakes, etc.

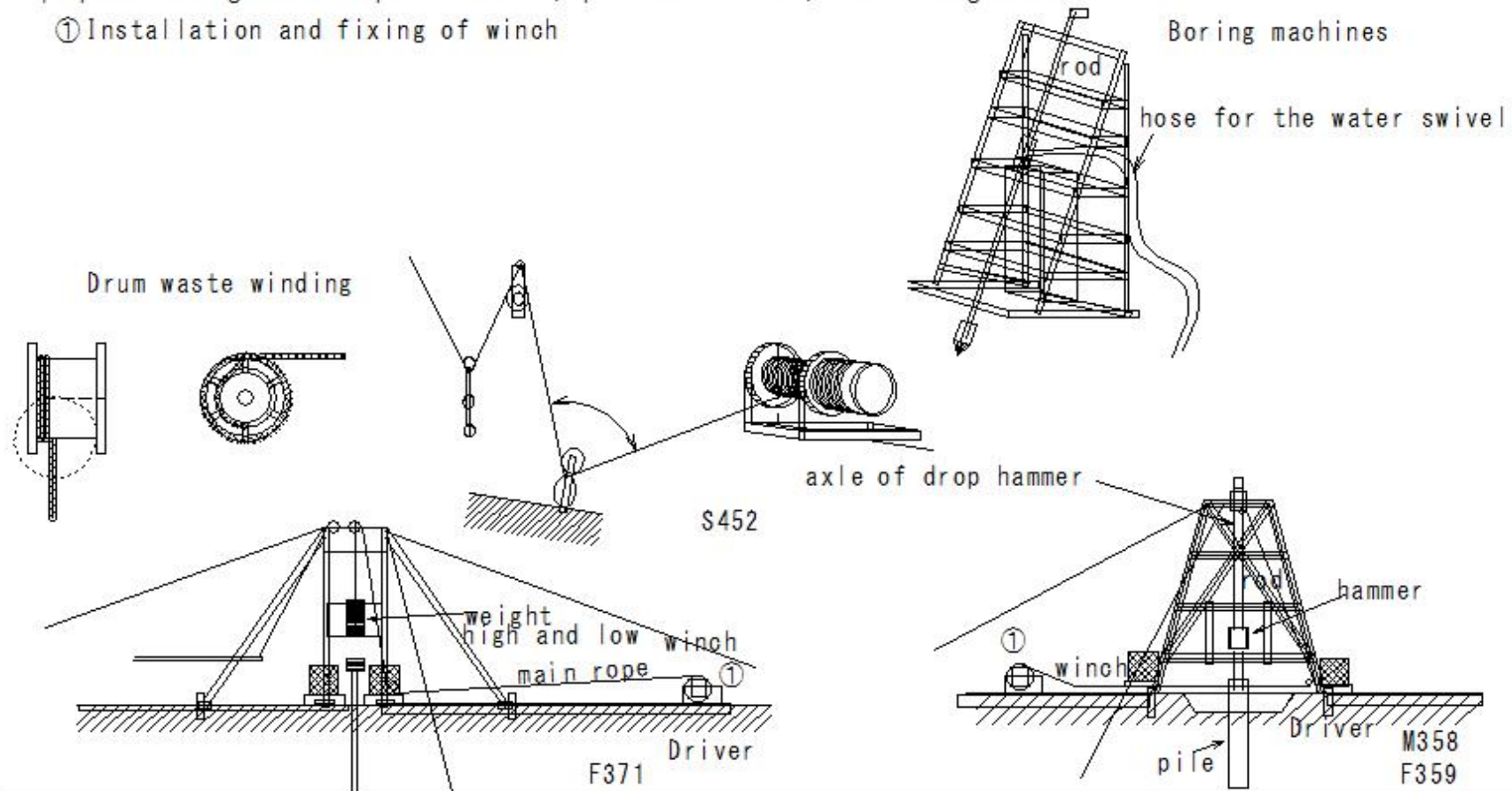


(S673) Pile drivers, Pile extractors, and Boring machines

(S673) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

① Installation and fixing of winch



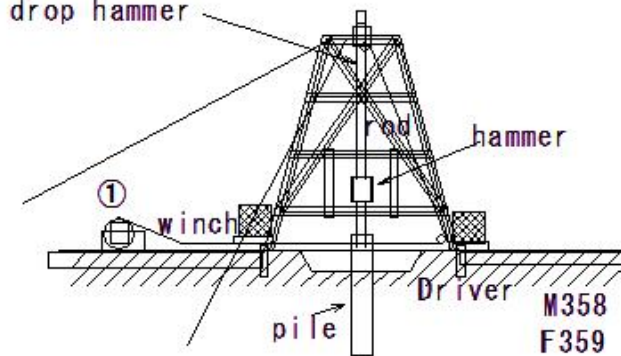
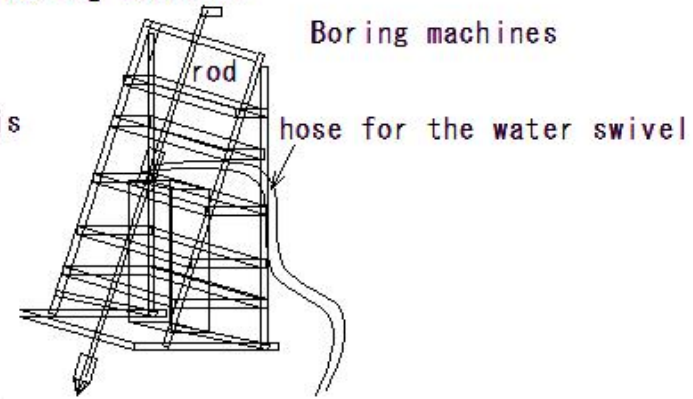
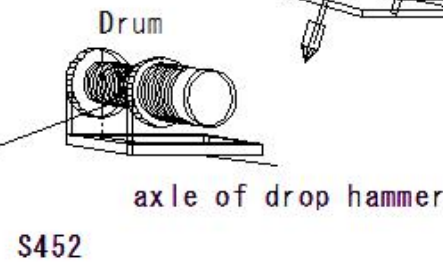
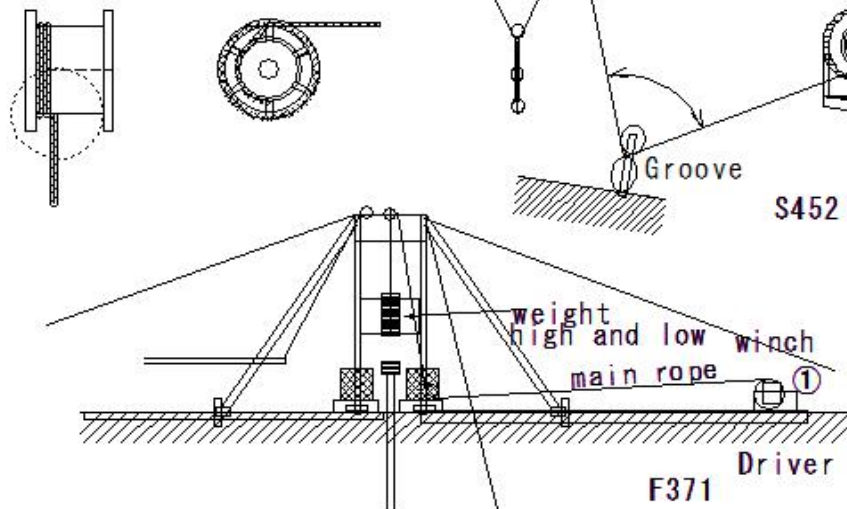
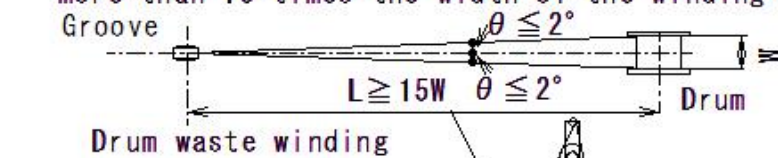
(S674) Pile drivers, Pile extractors, and Boring machines

(S674) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

Position of the groove

- ① The distance between the axis of the winding drum and the axis of the first groove from the hoisting device is more than 15 times the width of the winding drum



(S675) Pile drivers, Pile extractors, and Boring machines

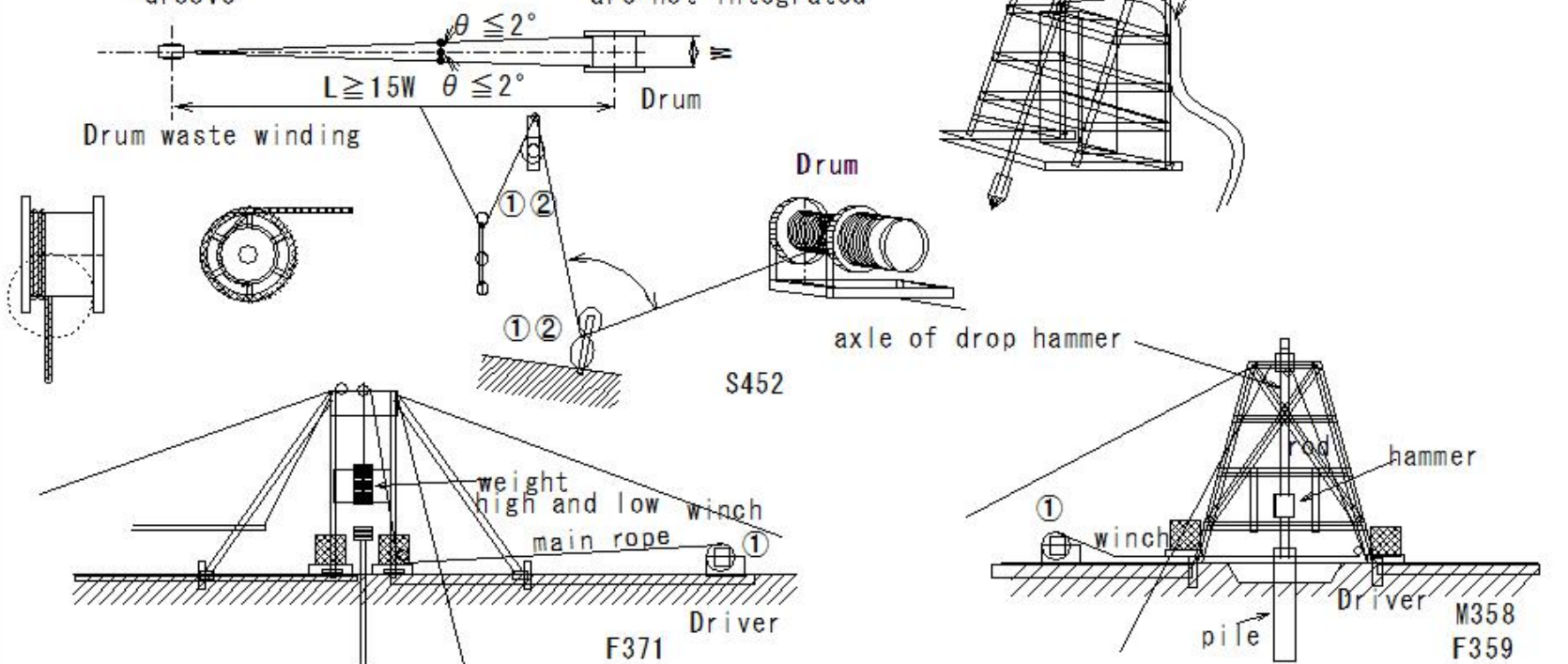
(S675) Pile drivers, Pile extractors, and Boring machines

Equipment management of pile drivers, pile extractors, and boring machines

Installation of grooves, etc.

① Securely install with mounting brackets, shackles, etc.

② The grooves of machines where the tower and winch are not integrated

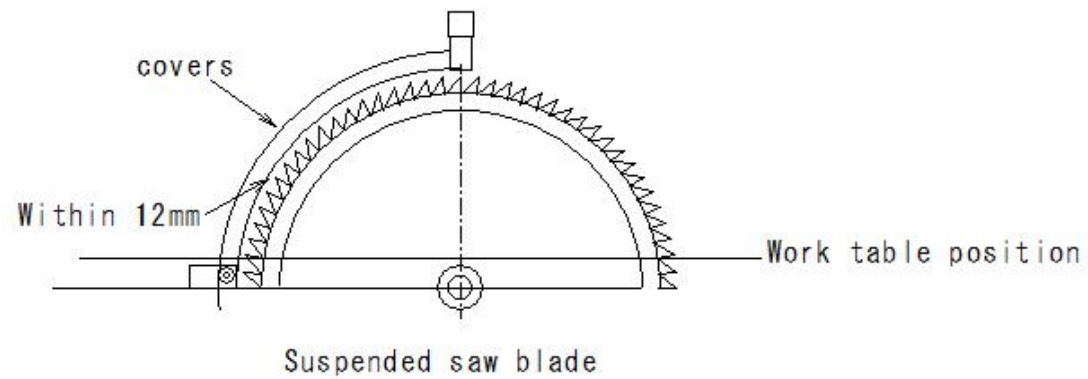


(S676) Wood processing machines

(S676) Wood processing machines

Preventing dangers from wood processing machines

Preventive measures against rebound for circular saws



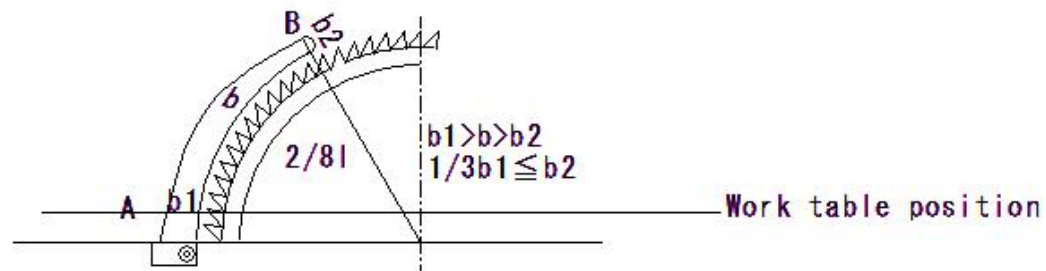
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(S677) Wood processing machines

(S677) Wood processing machines

Preventing dangers from wood processing machines

Preventive measures against rebound for circular saws

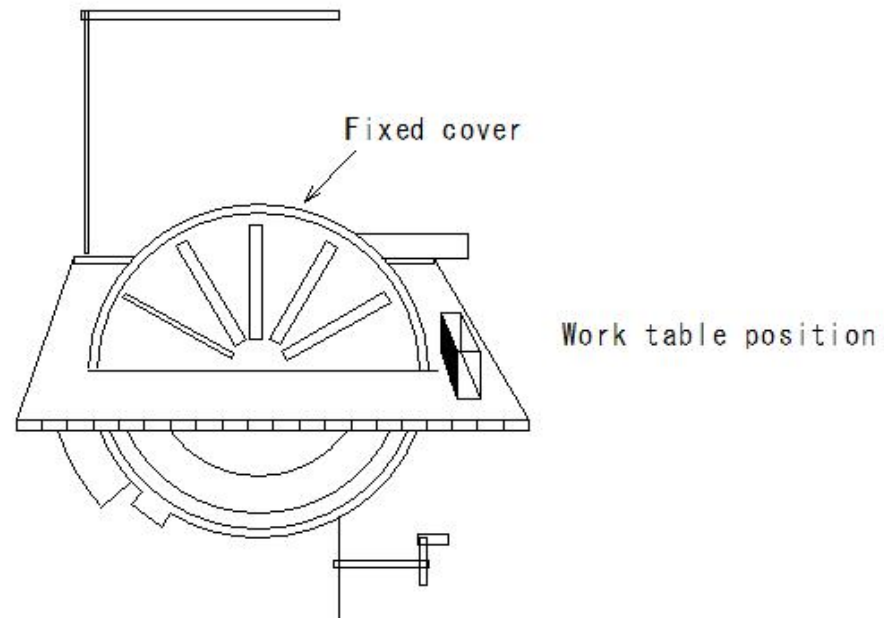


(S678) Wood processing machines

(S678) Wood processing machines

Preventing dangers from wood processing machines

Preventive measures against contact with teeth of circular saws



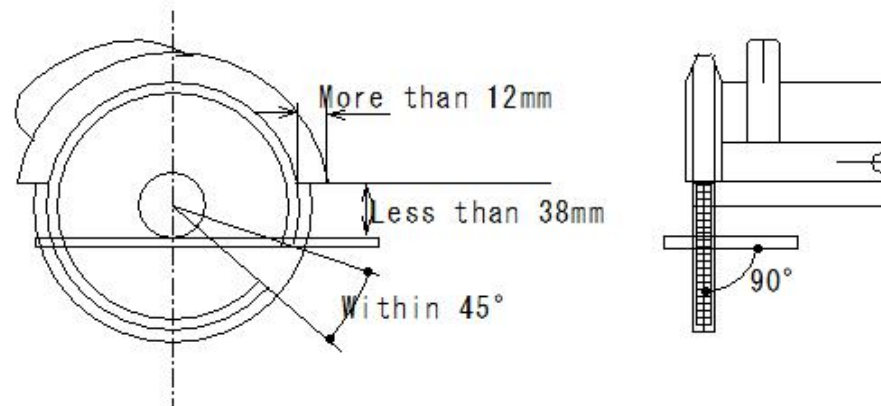
(S679) Wood processing machines

(S679) Wood processing machines

Preventing dangers from wood processing machines

Preventive measures against rebound for circular saws

Preventive measures against contact with teeth of circular saws



Opening of safety cover for circular saws

(S680) Wood processing machines

(S680) Wood processing machines

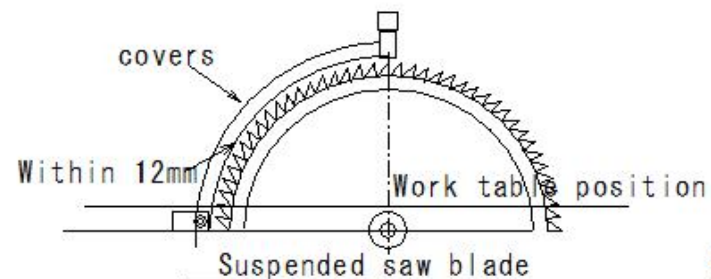
Preventing dangers from wood processing machines

Employer → Appointment → Wood processing machine supervisor

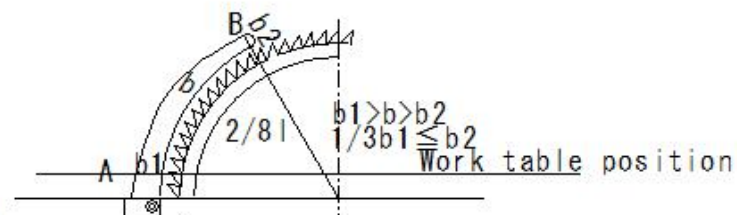
Appointed in case of 5 or more machines are owned at one business establishment

Duties

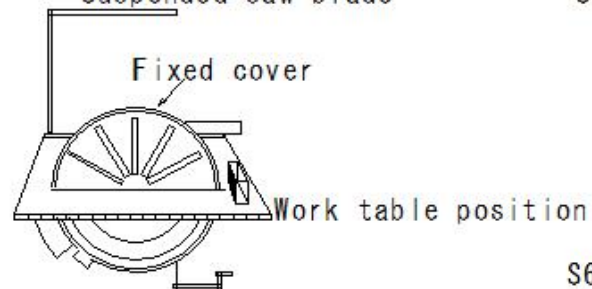
- ① Directly supervise the work
- ② Inspection of machines and safety devices
- ③ Machine and measures to be taken in the event of an abnormality in the safety device
- ④ Monitor the use of tools, etc.



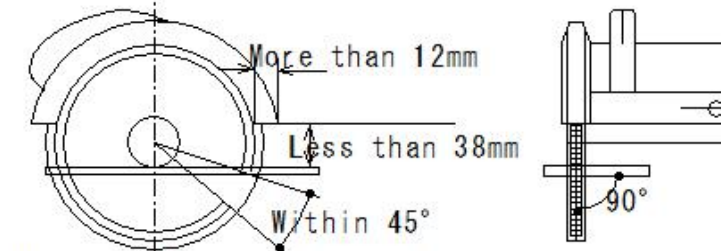
S676



S677



S678



Opening of safety cover for circular saws

S679

(S681) Wood processing machines

(S681) Wood processing machines

Prevention of dangers in woodworking machines

Prevention of dangers in grinding wheels

- ① Replacement of grinding wheels and test runs after replacement must be performed by those who have completed special training

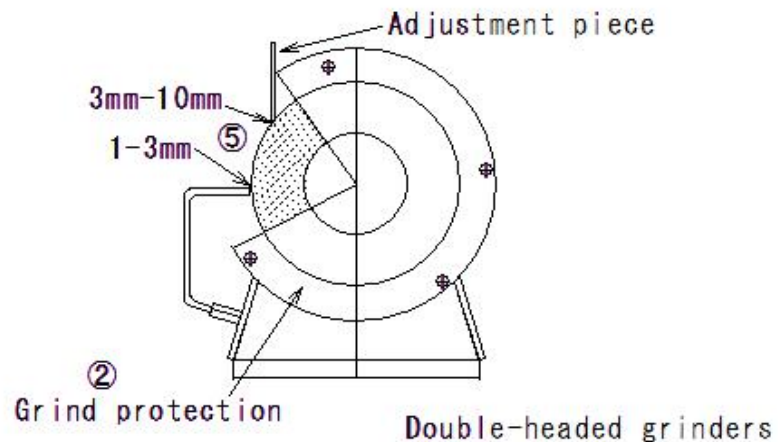
- ② Grinding wheels must be covered

- ③ Test run of grinding wheels

At least one minute before starting work

At least three minutes after replacing grinding wheels

- ④ Do not use grinding wheels at a speed that exceeds the maximum operating speed
- ⑤ Do not use the side of grinding wheels



(S682) Wood processing machines

(S682) Wood processing machines

Prevention of dangers in woodworking machines

Prevention of dangers in grinding wheels

- ① Replacement of grinding wheels and test runs after replacement must be performed by those who have completed special training

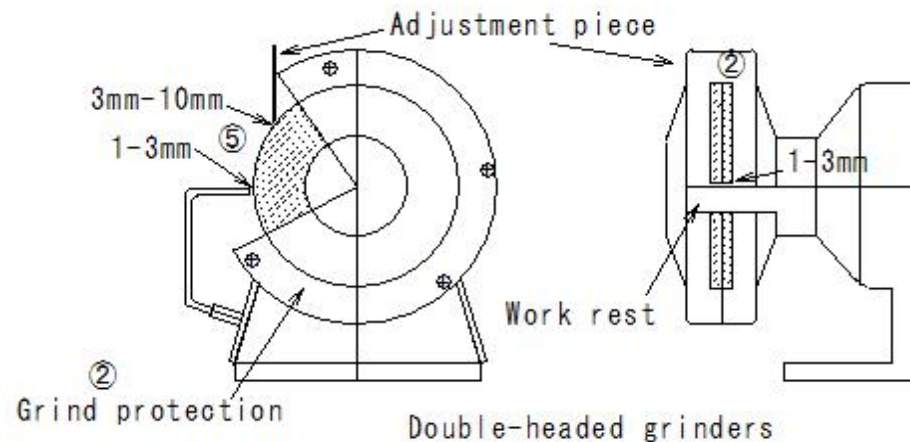
- ② Grinding wheels must be covered

- ③ Test run of grinding wheels

At least one minute before starting work

At least three minutes after replacing grinding wheels

- ④ Do not use grinding wheels at a speed that exceeds the maximum operating speed
- ⑤ Do not use the side of grinding wheels



(S683) Wood processing machines

(S683) Wood processing machines

Prevention of dangers in woodworking machines

Prevention of dangers in grinding wheels

- ① Replacement of grinding wheels and test runs after replacement must be performed by those who have completed special training

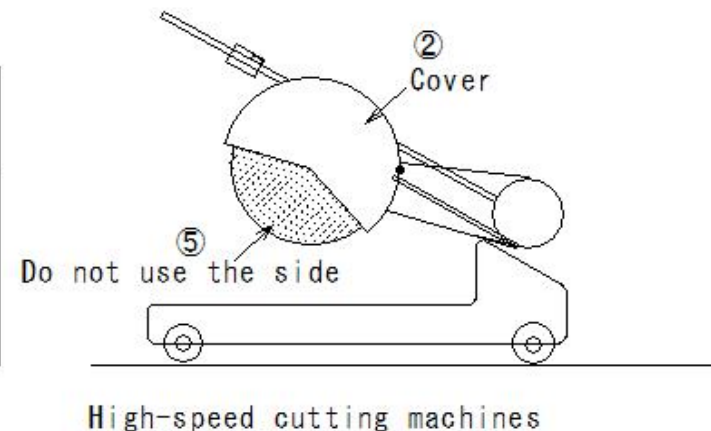
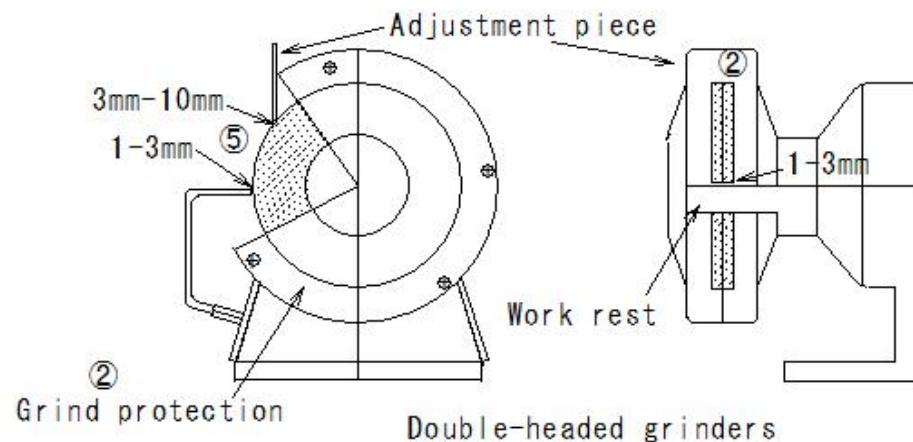
- ② Grinding wheels must be covered

- ③ Test run of grinding wheels

At least one minute before starting work

At least three minutes after replacing grinding wheels

- ④ Do not use grinding wheels at a speed that exceeds the maximum operating speed
- ⑤ Do not use the side of grinding wheels



(S684) Electrical Machinery, Wiring, and Moving Electric Cables

(S684) Electrical Machinery, Wiring, and Moving Electric Cables

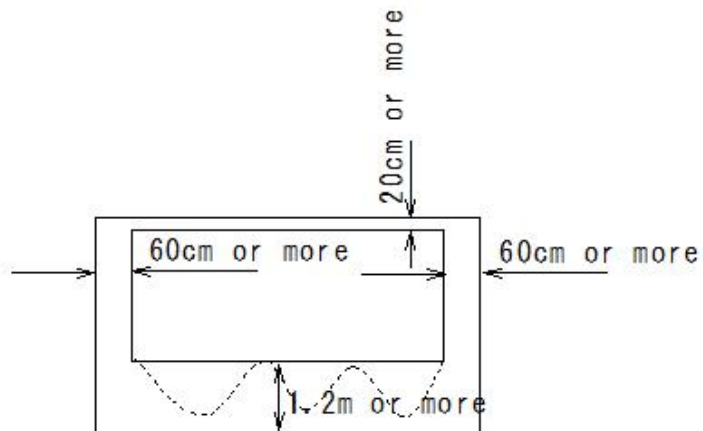
Safety of Electrical Machinery, Wiring, and Moving Electric Cables

Enclosures for Electrical Machinery, etc.

- ① If there is a risk of electric shock from contact or approaching live parts,
provide an enclosure or insulating cover to prevent electric shock.

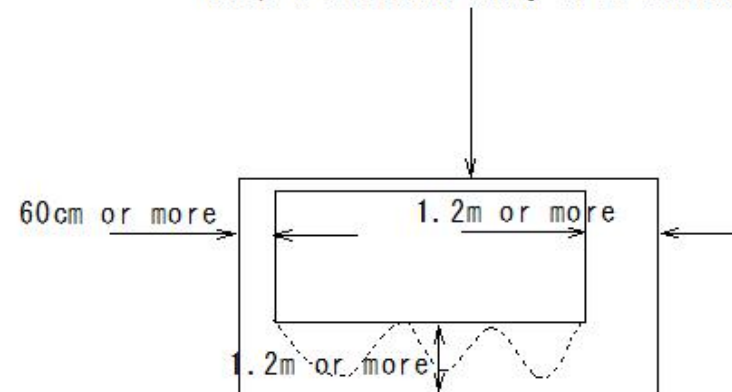
Examples of enclosures for high-voltage substation equipment

Areas with ventilation holes due to
welded construction, etc.



Areas without ventilation holes due to
welded construction, etc.

Keep a distance away from contact



(S685) Electrical Machinery, Wiring, and Moving Electric Cables

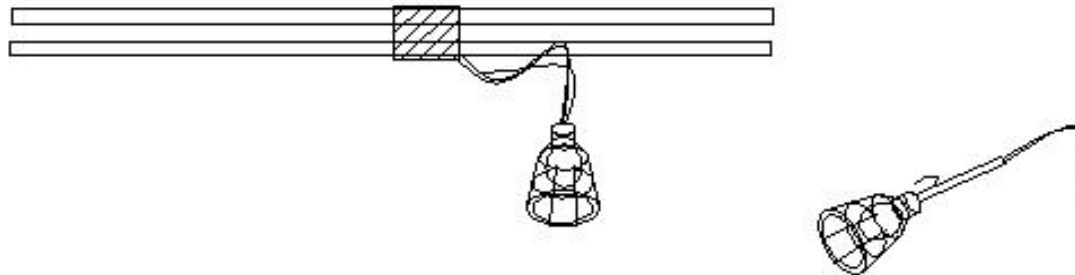
(S685) Electrical Machinery, Wiring, and Moving Electric Cables

Safety of Electrical Machinery, Wiring, and Moving Electric Cables

Guards for Handheld Lights, etc.

- ① Guards should be installed on handheld lights and overhead hanging lights to prevent danger from contact with the base and damage to the bulb.

Guards for Handheld Lights, etc.



(S686) Electrical Machinery, Wiring, and Moving Electric Cables

(S686) Electrical Machinery, Wiring, and Moving Electric Cables

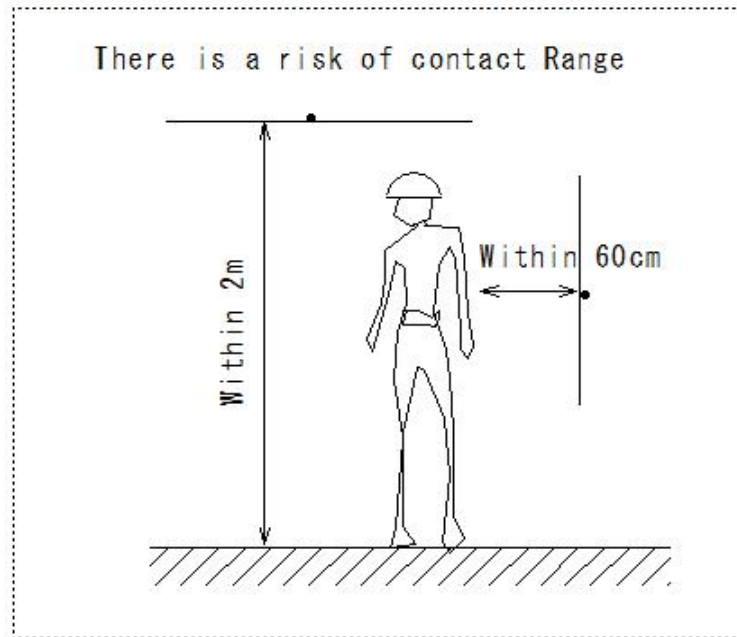
Safety of Electrical Machinery, Wiring, and Moving Electric Cables

Insulating Covering for Wiring, etc.

① For wiring that may be touched during work or while passing by,

Wiring: Insulating Covering

Moving Wiring: Electric Shock Prevention Measures



(S687) Electrical Machinery, Wiring, and Moving Electric Cables

(S687) Electrical Machinery, Wiring, and Moving Electric Cables

Safety of electrical equipment, wiring, and mobile electric wires

Sheathing or exterior of mobile electric wires, etc.

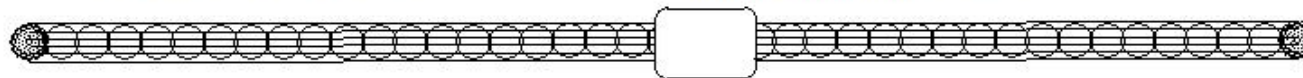
① In case of used in a place wet with water, etc.

Mobile electric wire: Type 2 cap-tire cable or higher

Connection equipment: Waterproof, drip-proof, outdoor, etc.

Mobile electric wire:

Connection equipment



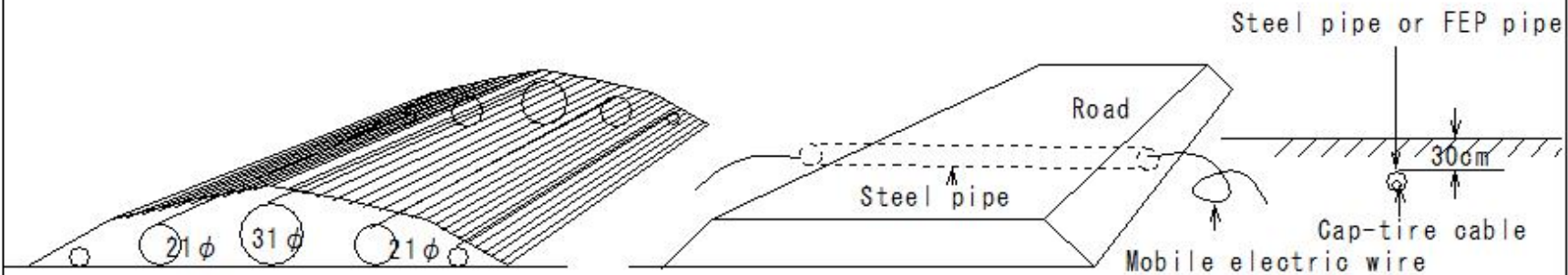
(S688) Electrical Machinery, Wiring, and Moving Electric Cables

(S688) Electrical Machinery, Wiring, and Moving Electric Cables

Safety of electrical equipment, wiring, and mobile electric wires

Temporary wiring, etc.

- ① Do not use temporary wiring or mobile electric wires on the passage surface
- ② In case of vehicles pass through, install protective covering



Example of ground protection

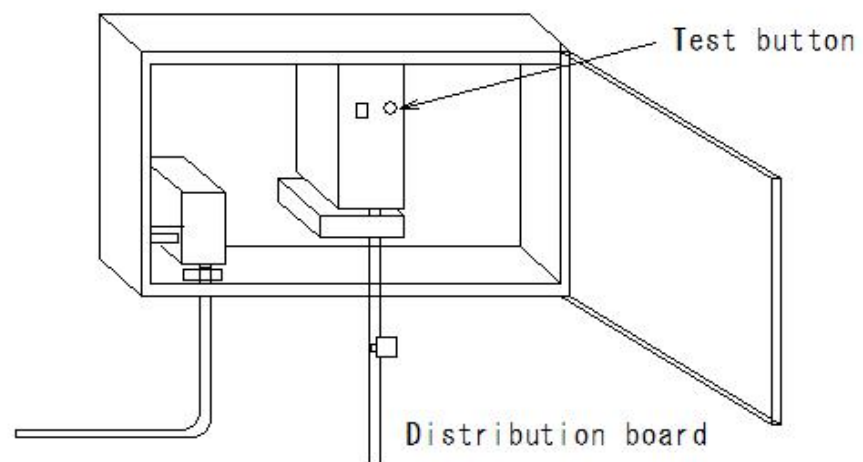
Example of buried protection

(S689) Inspection of electrical equipment, etc.

(S689) Inspection of electrical equipment, etc.

Inspection of electrical equipment, etc.

Check operation with test button before use



Before starting

Inspector → On-site inspection → Repair any abnormalities

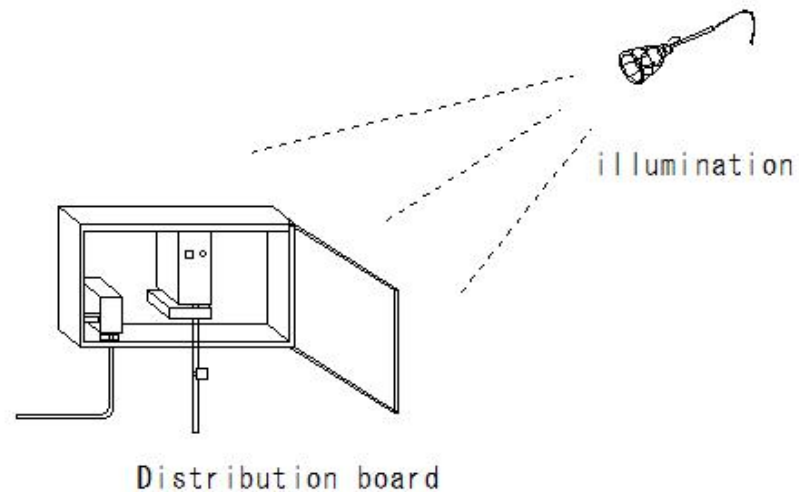
(S690) Inspection of electrical equipment, etc.

(S690) Inspection of electrical equipment, etc.

Inspection of electrical equipment, etc.

Illuminance of the operating parts of electrical equipment

Maintain the necessary illumination for the operating parts to prevent danger
from electric shock or incorrect operation



(S691) Inspection of electrical equipment, etc.

(S691) Inspection of electrical equipment, etc.

Inspection of electrical equipment, etc.

Inspection of automatic electrical protection devices

① Welders should check the grounding and lid condition of the outer box before starting use

Wiring to the welding machine and damage to the welding equipment Yes or no

Check for damage to indicator lights and inspection switches

and for the presence or absence of abnormal noises or odors

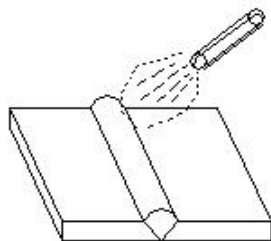
② Electrical handlers, etc., should conduct regular inspections once every six months

to check the condition of the attachment to the outer box, the presence or absence

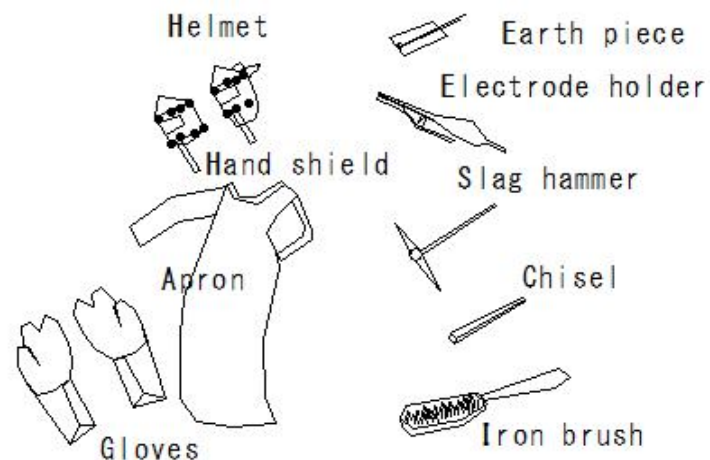
of fuse abnormalities, the condition of the wear on the contacts

of the electromagnetic contactor, etc. and record the results

Arc welding



B477



B445

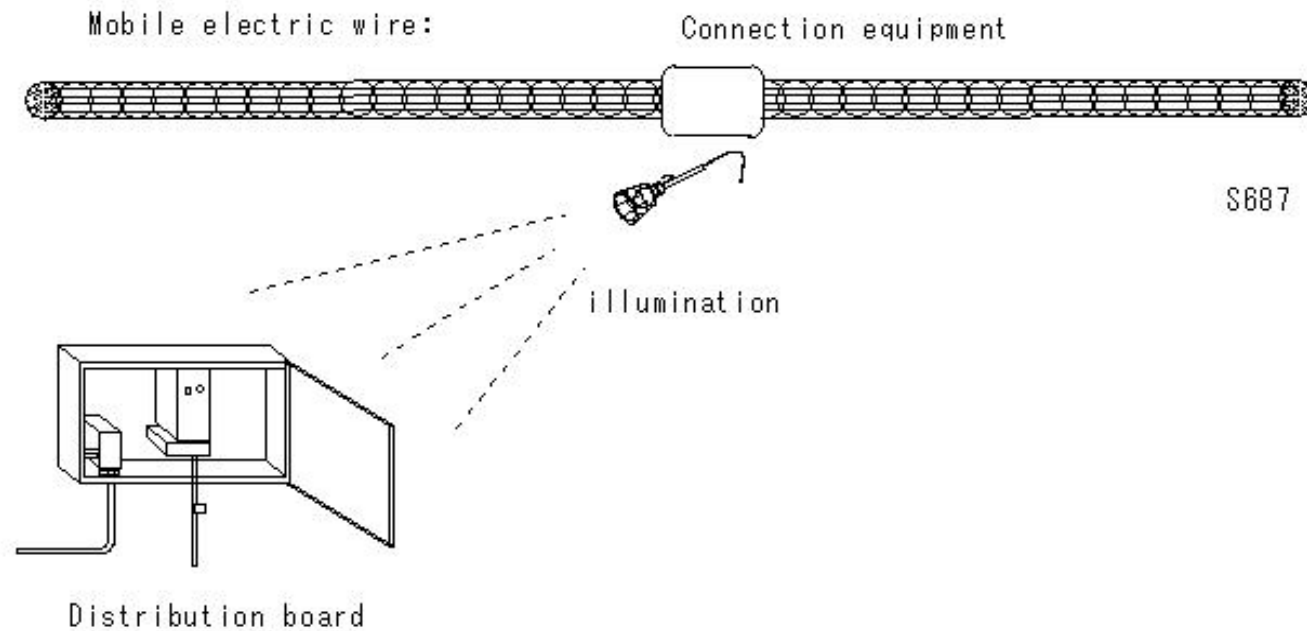
(S692) Inspection of electrical equipment, etc.

(S692) Inspection of electrical equipment, etc.

Inspection of electrical machinery and equipment

Inspection of enclosures for electrical machinery and equipment

- ① Check enclosures and insulating covers at least once a month for loose or detached attachments and for damage, and immediately repair if abnormalities are found



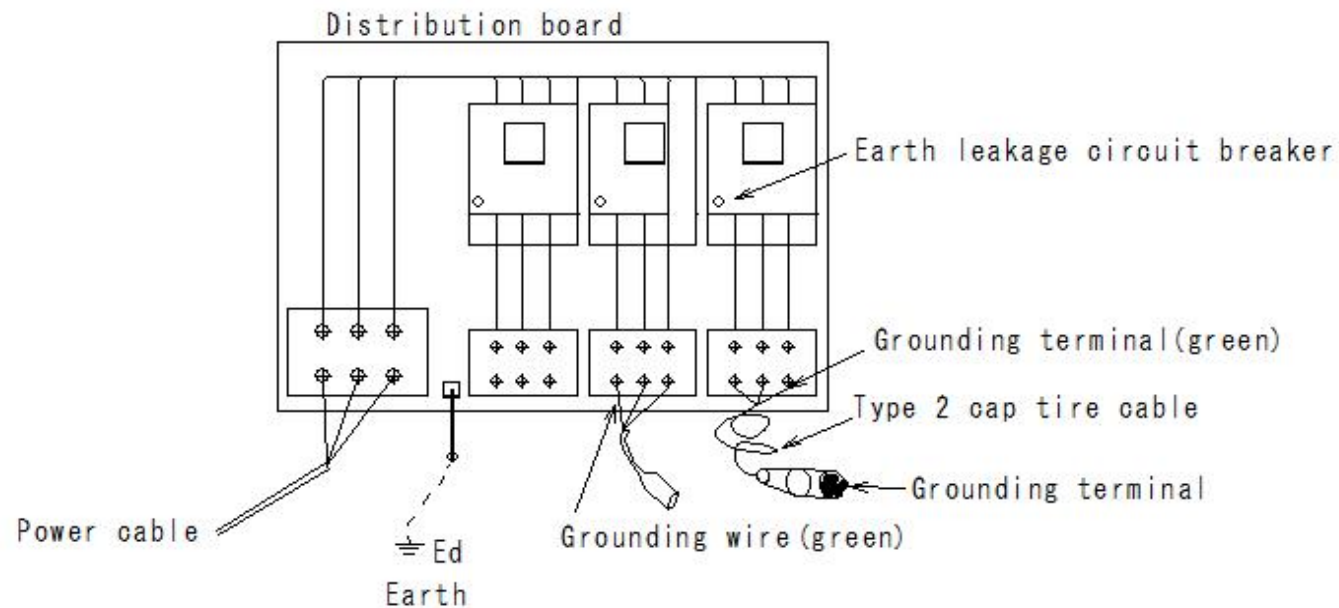
(S693) Electric Shock

(S693) Electric Shock

Preventing electric shock due to leakage current and grounding work

Preventing electric shock due to leakage current

① Installation of leakage current interrupter to prevent electric shock



(S694) Electric Shock

(S694) Electric Shock

Preventing electric shock due to leakage current and grounding work

In case of it is not possible to install a leakage current interrupter

Metal parts of electric machinery and equipment must be grounded before use

① Double-insulated electric machinery and equipment

② Power distribution board

③ Lighting distribution board

④ Installation of grounding wire (rod) Installation method

⑤ Earth wire (green wire)

⑥ Volcon (grounding terminal)

⑥-1 Drive-in lead terminal

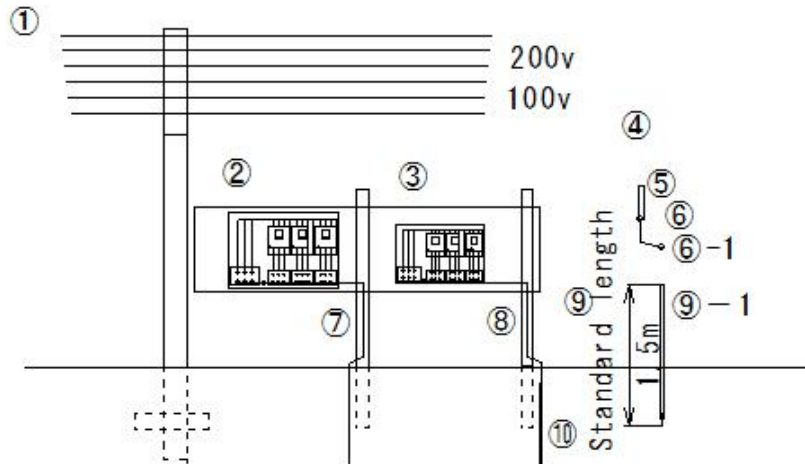
⑦ Fix with staples

⑧ Fix with saddles

⑨ Protect the installation with metal pipes, etc.

⑨-1 Grounding rod (copper-clad steel rod)

⑩ Earth pole (rod)



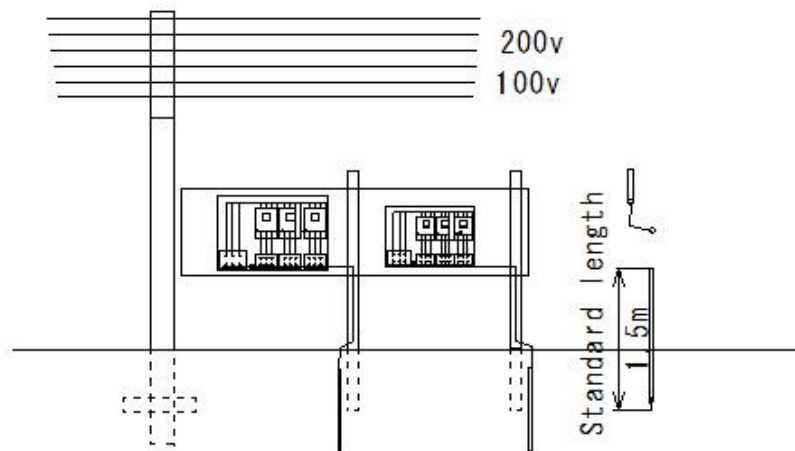
Example of D-type grounding work

(S695) Electric Shock

(S695) Electric Shock

Preventing electric shock due to leakage current and grounding work

Technical guidelines on safety standards for connecting and
using earth leakage circuit breakers to prevent electric shock



Example of D-type grounding work

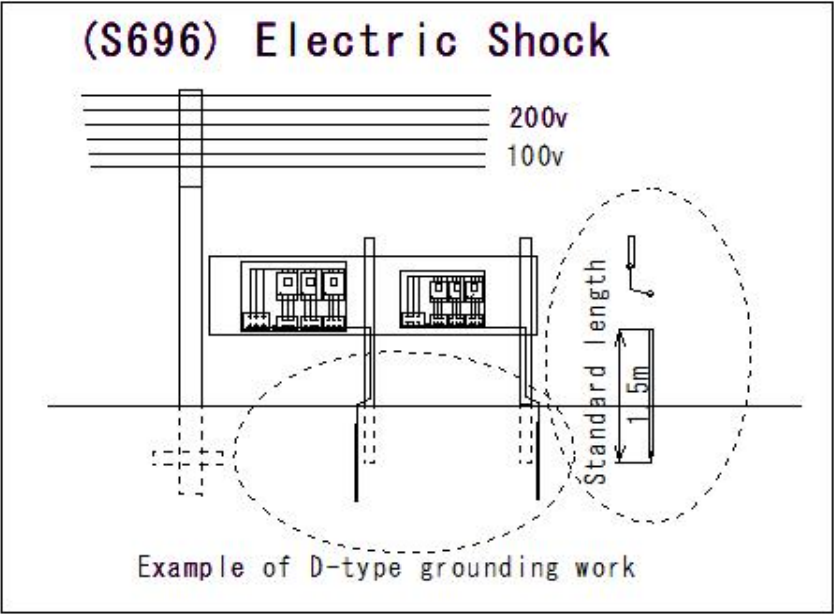
(S696) Electric Shock

(S696) Electric Shock

Prevention of electric shock due to leakage current and grounding work

Types of installation work and their applications

Types of grounding work	Grounding resistance value	Grounding wire thickness	Classification of machinery and equipment
Type A grounding work	10Ω or less	Diameter 2.6mm or more	For high voltage or extra high voltage
Type D grounding work	100Ω or less	Diameter 1.6mm or more	For low voltage of 300V or less
Type C grounding work	10Ω or less	Diameter 1.6mm or more	For low voltage of over 300V



(S697) Overhead Power Lines

(S697) Overhead Power Lines

Work near overhead power lines, etc.

Prevention of electric shock when carrying out work such as the construction of structures

In case of carrying out construction work (pile drivers, mobile cranes, etc.)

in a location close to a charging line such as an overhead power line

Measures to prevent electric shock

- ① Relocation of charging line
- ② Fence to prevent electric shock
- ③ Attach insulating protective equipment to the charging line
- ④ In case of measures ① to ③ cannot be taken, assign a supervisor to monitor the work

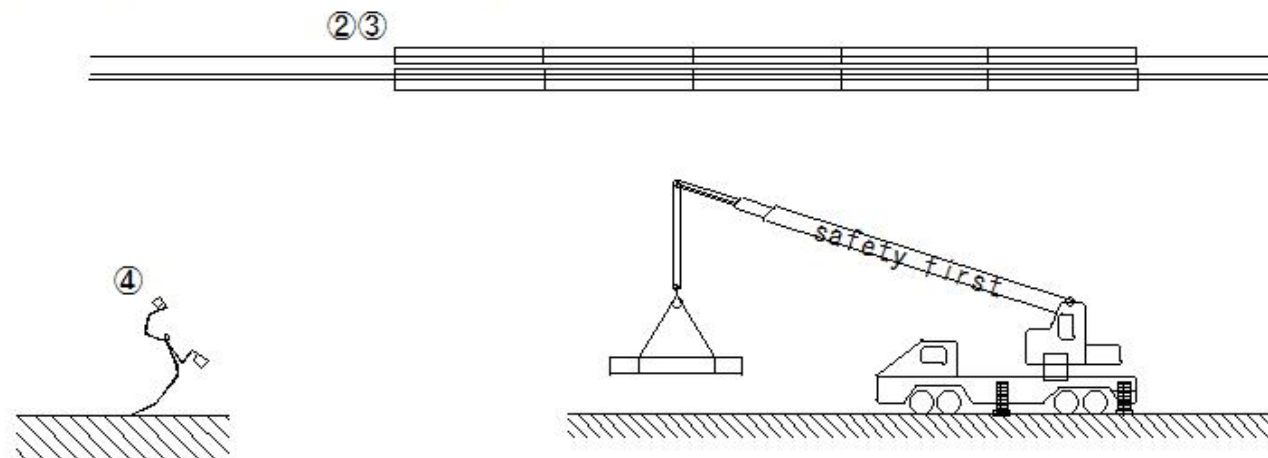


Fig. 3.27 Measures to prevent electric shock

S149

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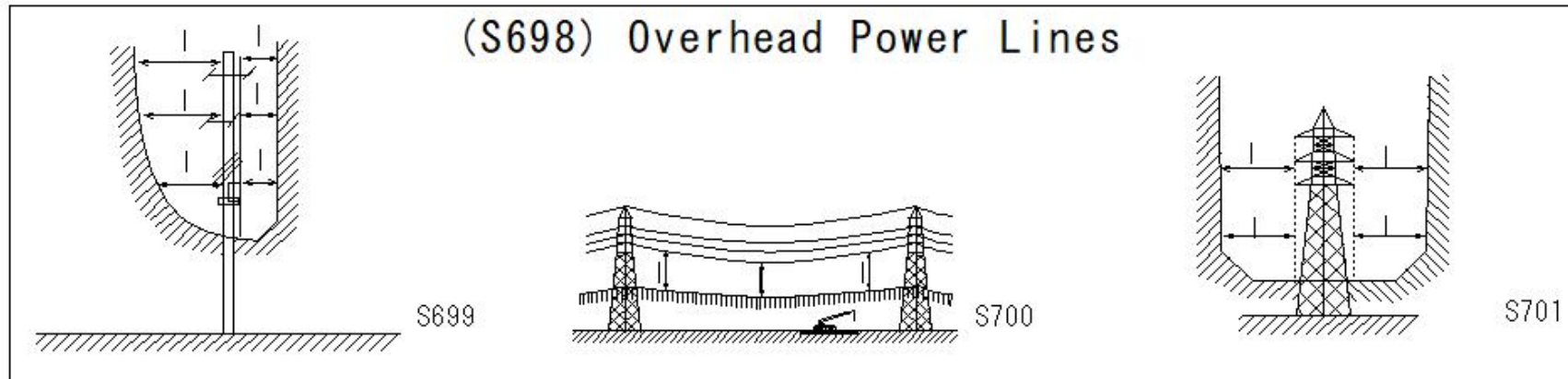
(S698) Overhead Power Lines

(S698) Overhead Power Lines

Work near overhead power lines, etc.

Safe distance from transmission and distribution lines

Electric circuit	Transmission voltage	Minimum separation distance		Quantity
		Labor Standards Bureau	Power company target	
Distribution line	100V/200V	1.0m or more	2.0m or more	-
	6,600V or less	1.2m or more	2.0m or more	-
Transmission line	22,000V or less	2.0m or more	3.0m or more	2~4
	66,000V or less	2.2m or more	4.0m or more	5~9
	154,000V or less	4.0m or more	5.0m or more	7~21
	275,000V or less	6.4m or more	7.0m or more	16~30
	500,000V or less	10.8m or more	11.0m or more	20~41

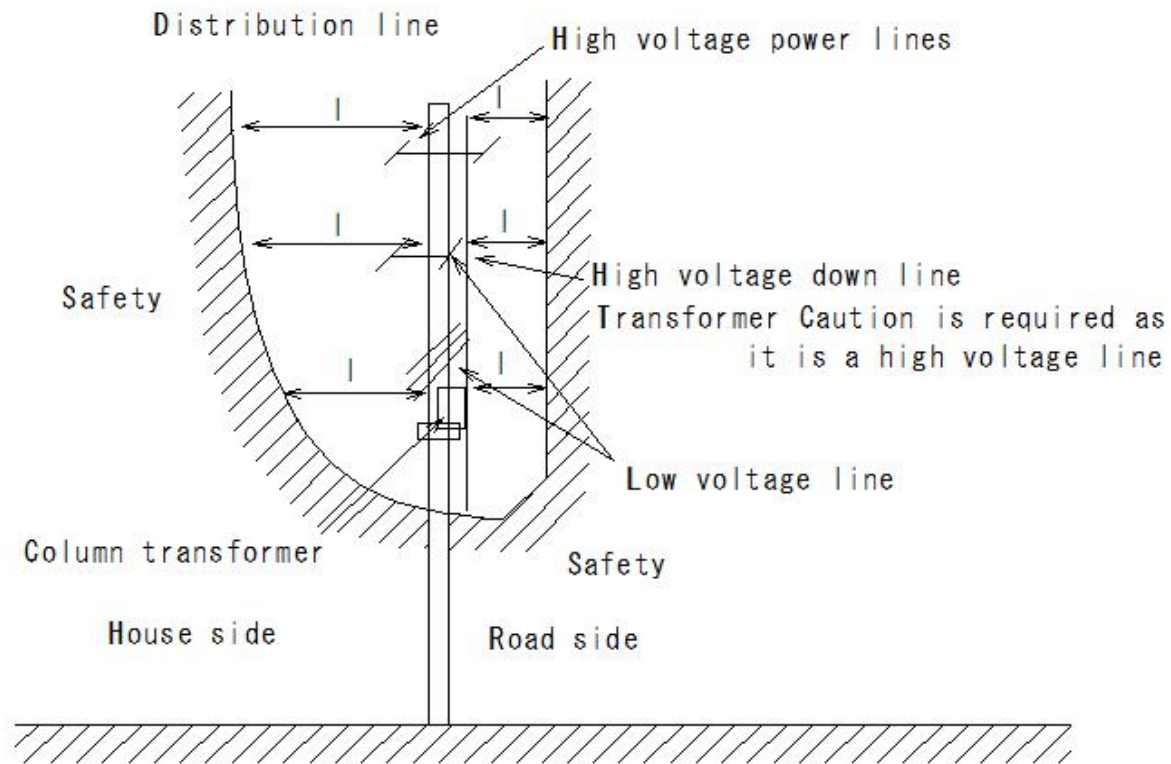


(S699) Overhead Power Lines

(S699) Overhead Power Lines

Work near overhead power lines, etc.

Safe distance from transmission and distribution lines

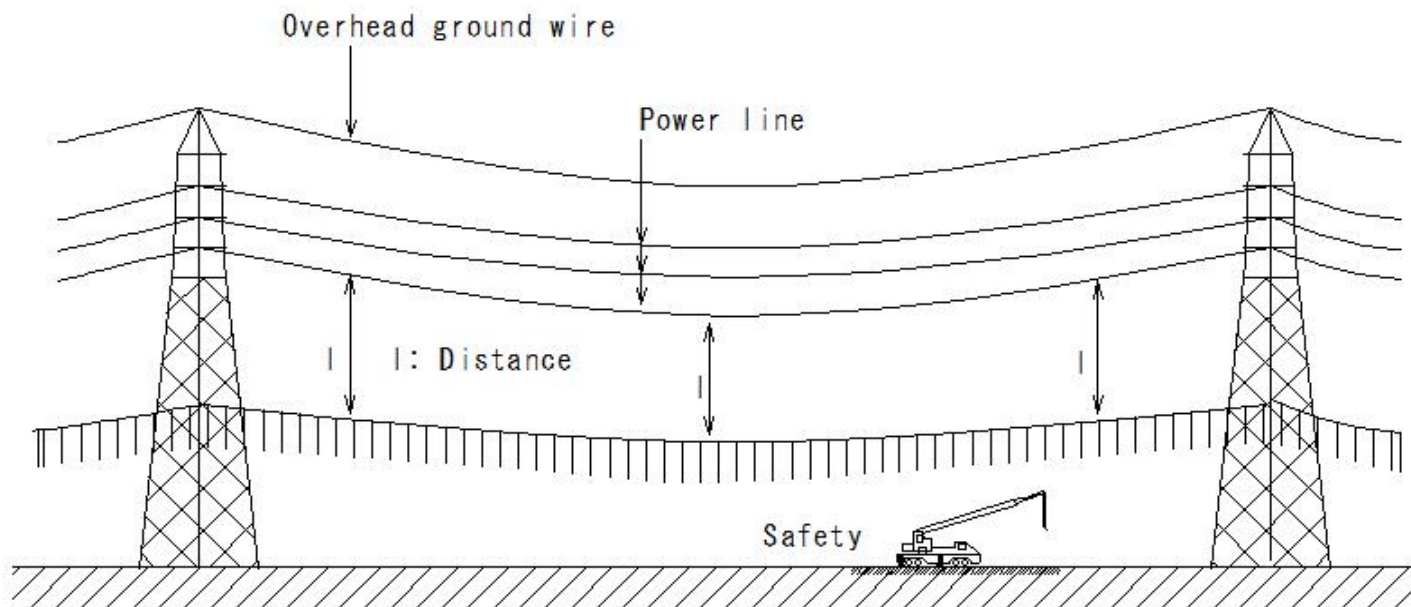


(S700) Overhead Power Lines

(S700) Overhead Power Lines

Working close to overhead power lines, etc.

Safe distance from power lines



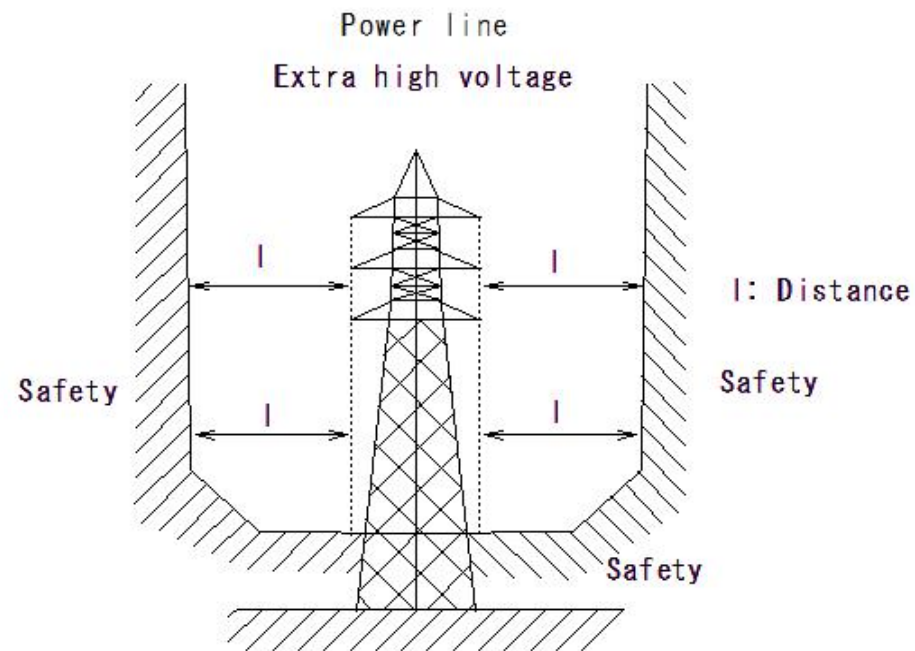
(S701) Overhead Power Lines

(S701) Overhead Power Lines

Working close to overhead power lines, etc.

Safe distance from power lines

Power line



(S702) Overhead Power Lines

(S702) Overhead Power Lines

Working close to overhead power lines, etc.

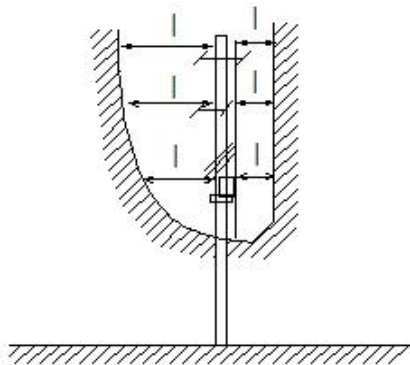
Type of voltage

Low voltage: 750V or less for direct current

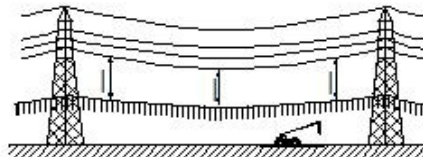
...600V or less for alternating current

High voltage: above low voltage and 7,000V or less

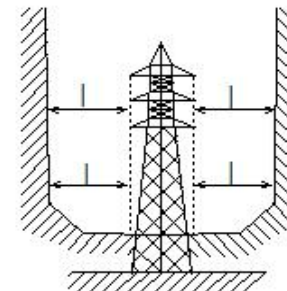
Extra high voltage: over 7,000V



S699



S700

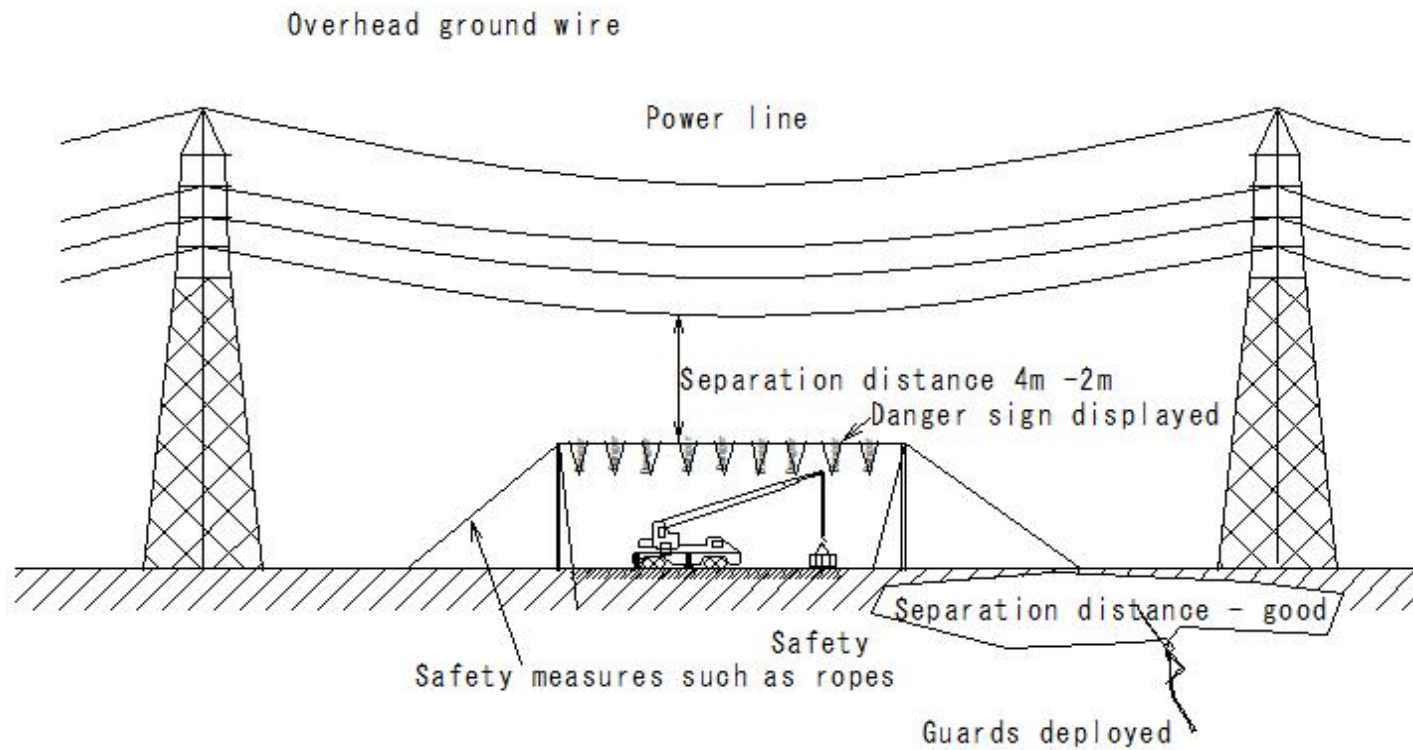


S701

(S703) Overhead Power Lines

(S703) Overhead Power Lines

Working close to overhead power lines, etc.



(S704) Generator

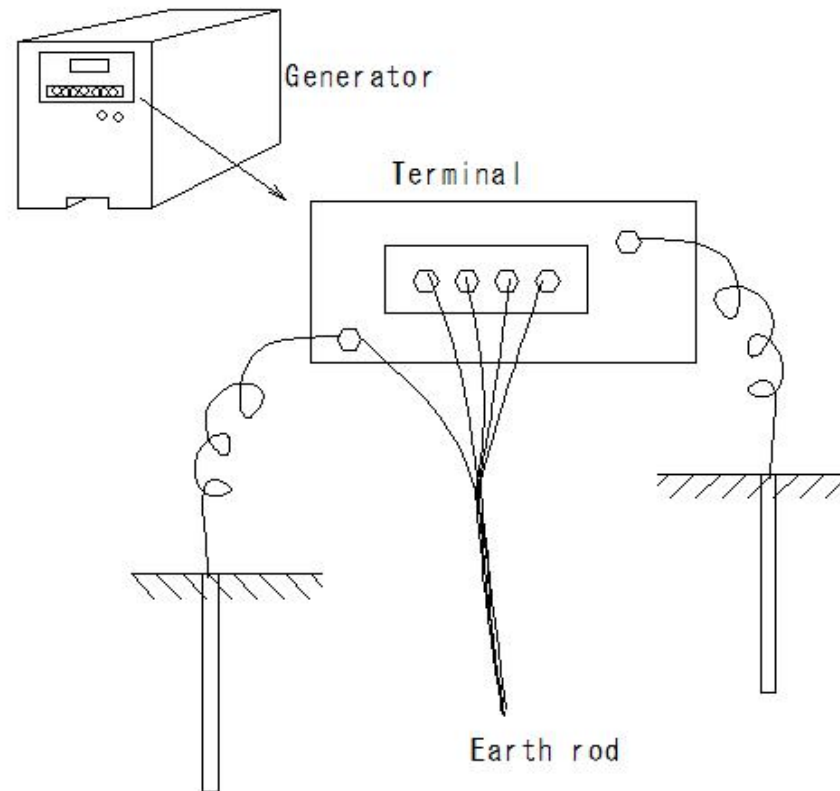
(S704) Generator

How to ground a generator

Use a generator equipped with a high-sensitivity, high-speed earth leakage circuit breaker

① Rated sensitivity current: 30mA

② Operating time: 0.1sec



(S705) Generator

Power (3-phase 200V) and electric light (single-phase 100V)
for an engine-powered arc welding machine (welder)

① Terminal

② Functional grounding terminal

③ U V W O

④ Grounding wire (green) 8mm² or more

⑤ Outer box grounding terminal (case earth)

⑥ Outer box ground terminal

⑦ Grounding wire (green) 8mm² or more

⑧ Do not connect a grounding wire to the terminal

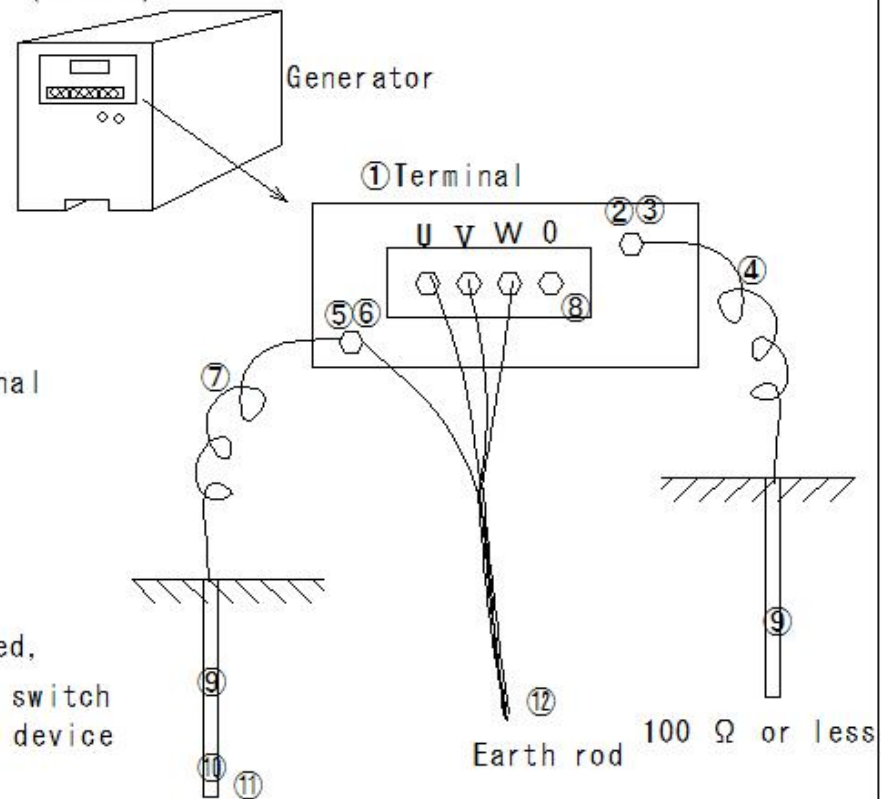
⑨ Earth rod

⑩ Drive the earth rod so that the top end is fully hidden in the ground

⑪ Operating voltage: 200V 100 ohms or less

Operating voltage: 400V 10 ohms or less

⑫ In case of multiple electrical devices are used,
connect a distribution machine and install a switch
for each device

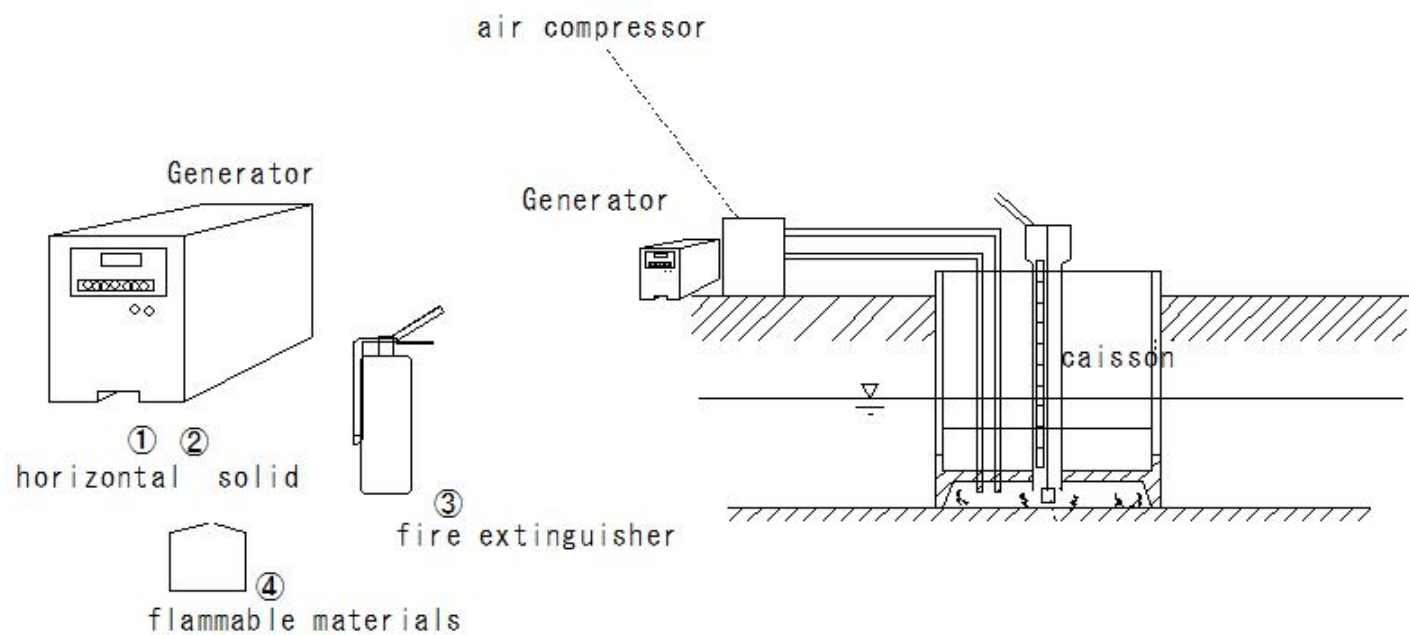


(S706) Generator

(S706) Generator

Grounding method for generators

- ① Install on a level, solid foundation
- ② Install in a well-ventilated location
- ③ Install a fire extinguisher
- ④ Avoid humid locations or locations with flammable materials nearby



M262
F59

(S707) Generator

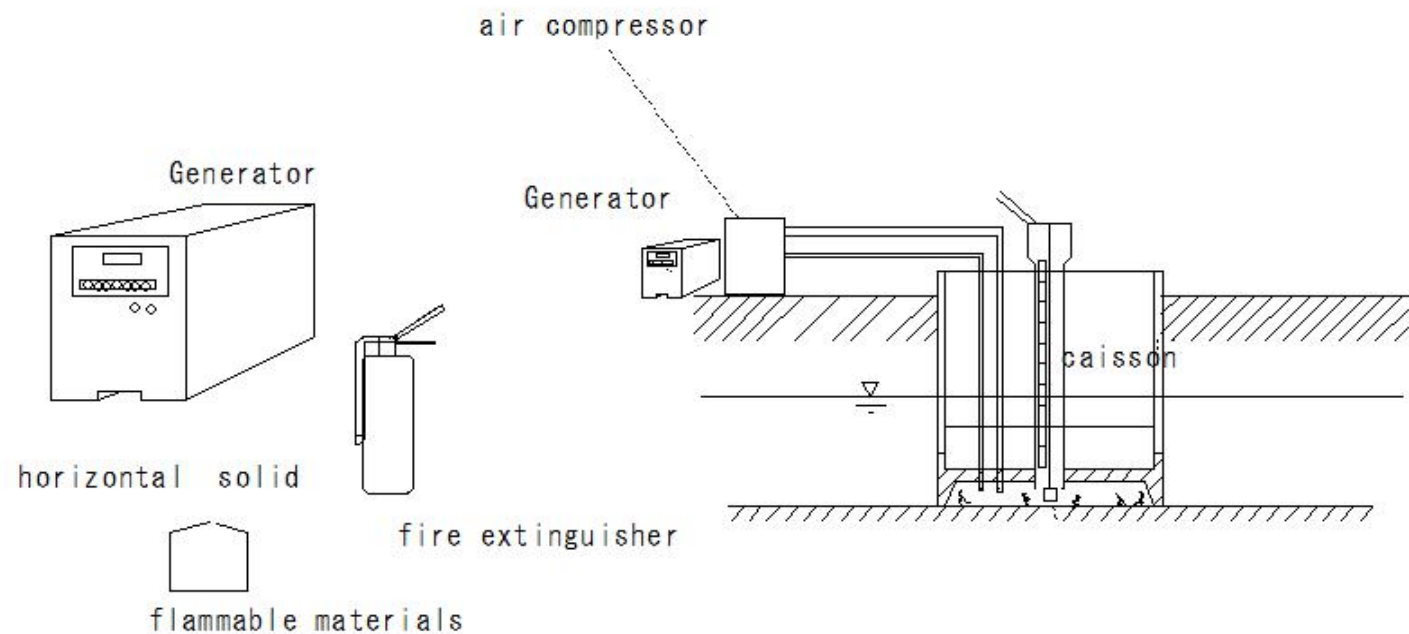
(S707) Generator

Grounding method for generators

Electricity Business Act

For electrical equipment such as power generation facilities (10 kW or more),

Notification of safety regulations and appointment and notification of a chief electrical engineer are required.



M262
F59

(S708) Track equipment

(S708) Track equipment

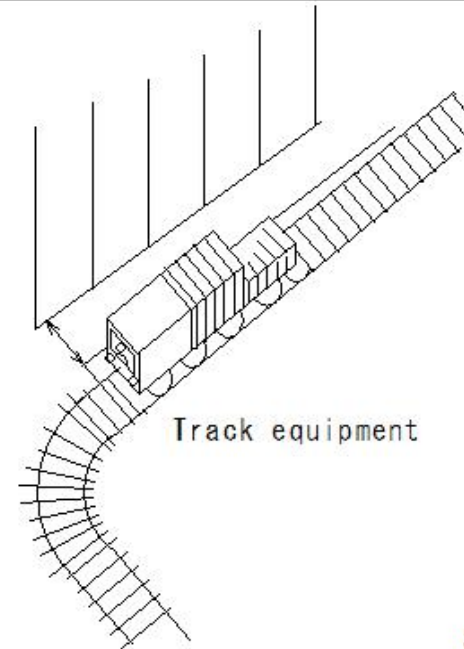
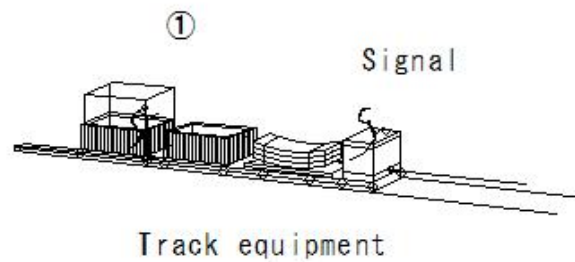
Safe work on track equipment

Track equipment

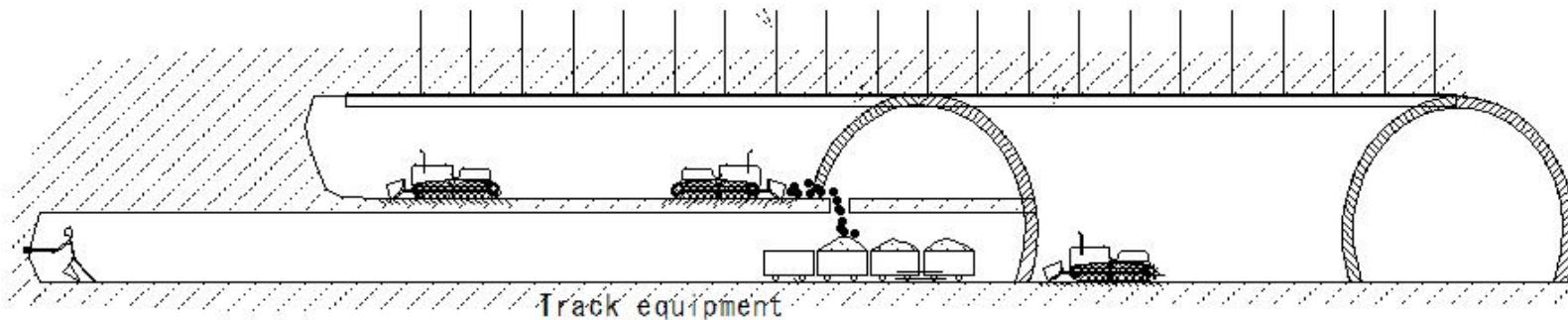
Transports workers or cargo using rails powered by power

Signal display method

①Decide and publicize display method



S126



S60

T148

T31

(S709) Track equipment

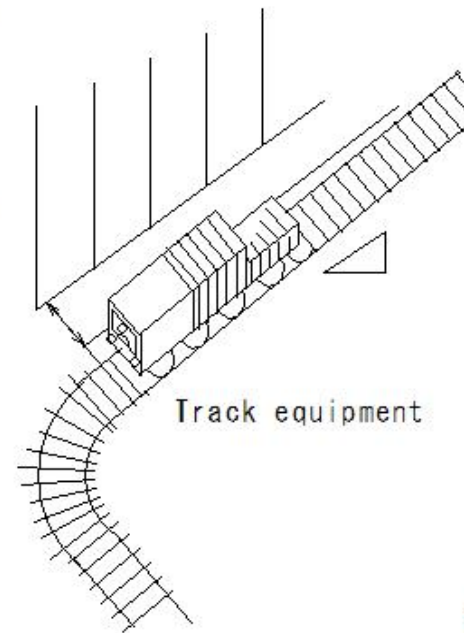
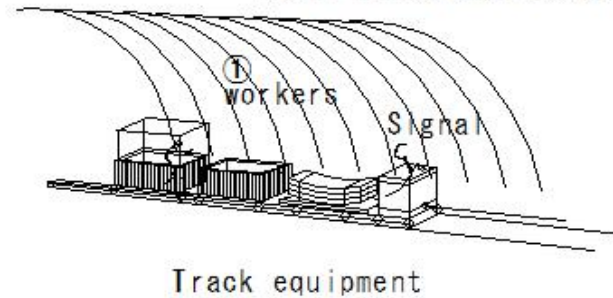
(S709) Track equipment

Safe work on track equipment

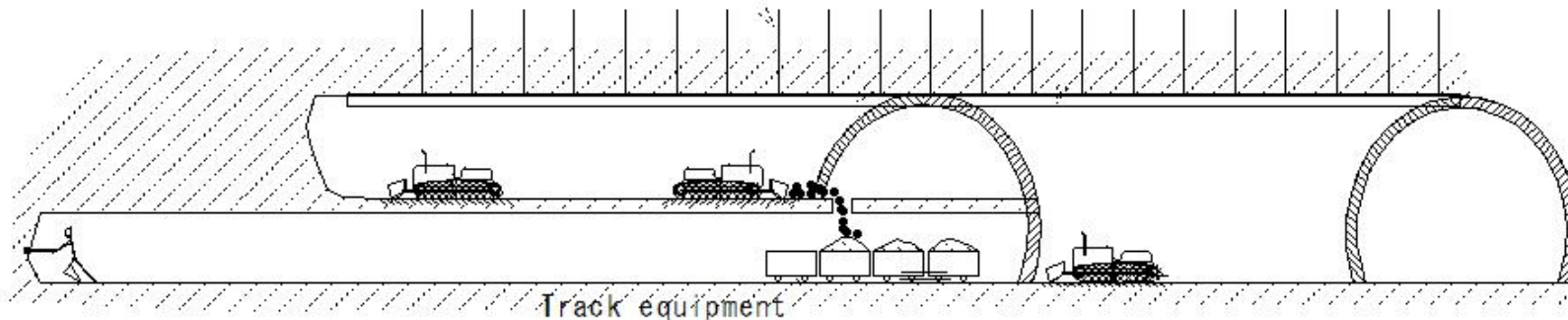
Track equipment

Use a handcart in case of transporting workers

- ① In case of transporting a small number of people or temporarily
Just set up a fence or other means to prevent passengers
from riding with cargo



S126



S60
T148
T31

(S710) Track equipment

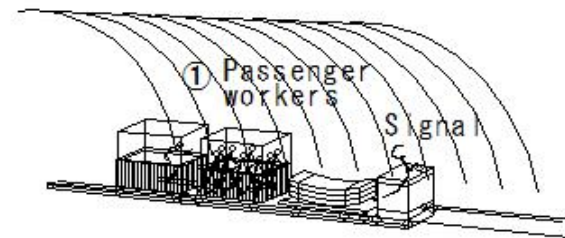
(S710) Track equipment

Safe work on track equipment

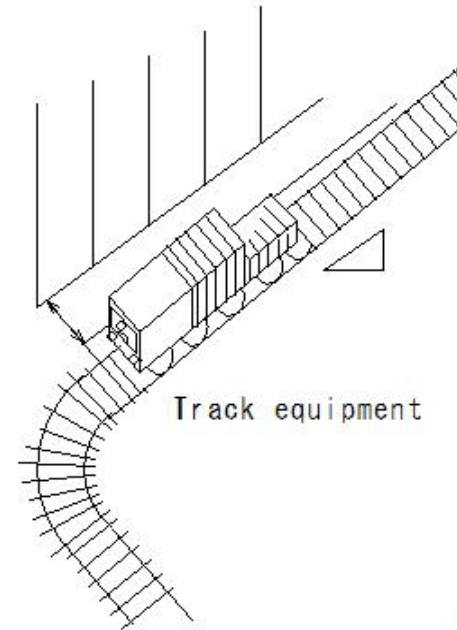
Track equipment

Passenger capacity

①Decide and publicize capacity

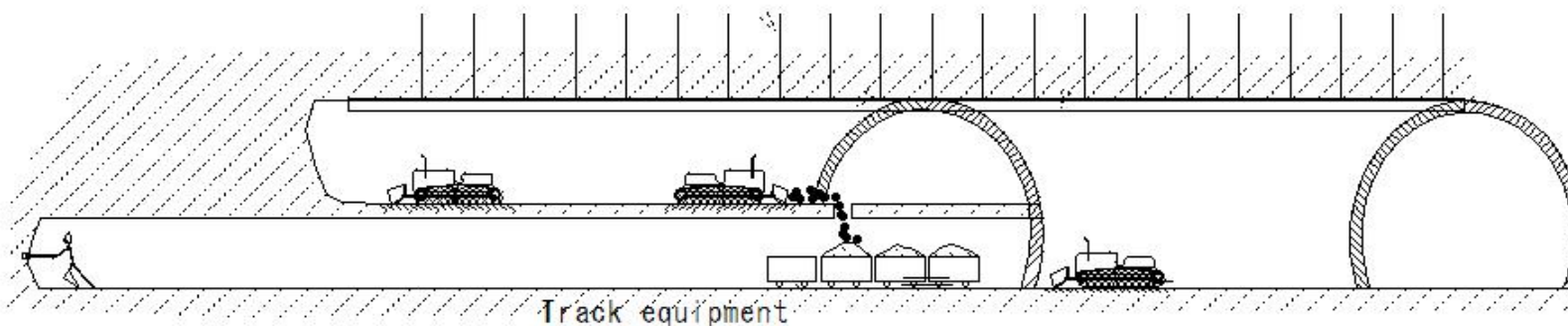


Track equipment



Track equipment

S126



Track equipment

S60
T148
T31

(S711) Track equipment

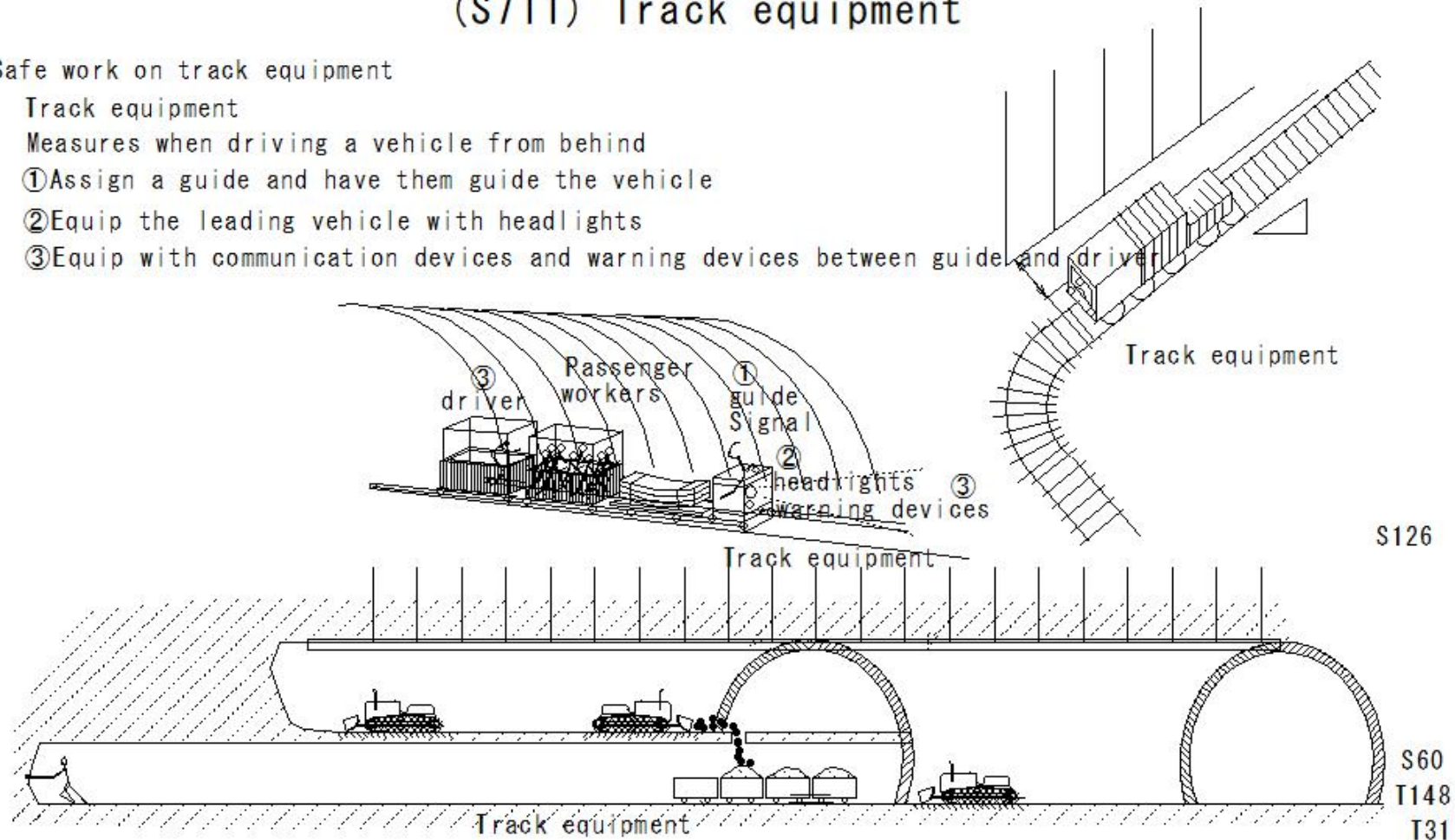
(S711) Track equipment

Safe work on track equipment

Track equipment

Measures when driving a vehicle from behind

- ①Assign a guide and have them guide the vehicle
- ②Equip the leading vehicle with headlights
- ③Equip with communication devices and warning devices between guide and driver



(S712) Track equipment

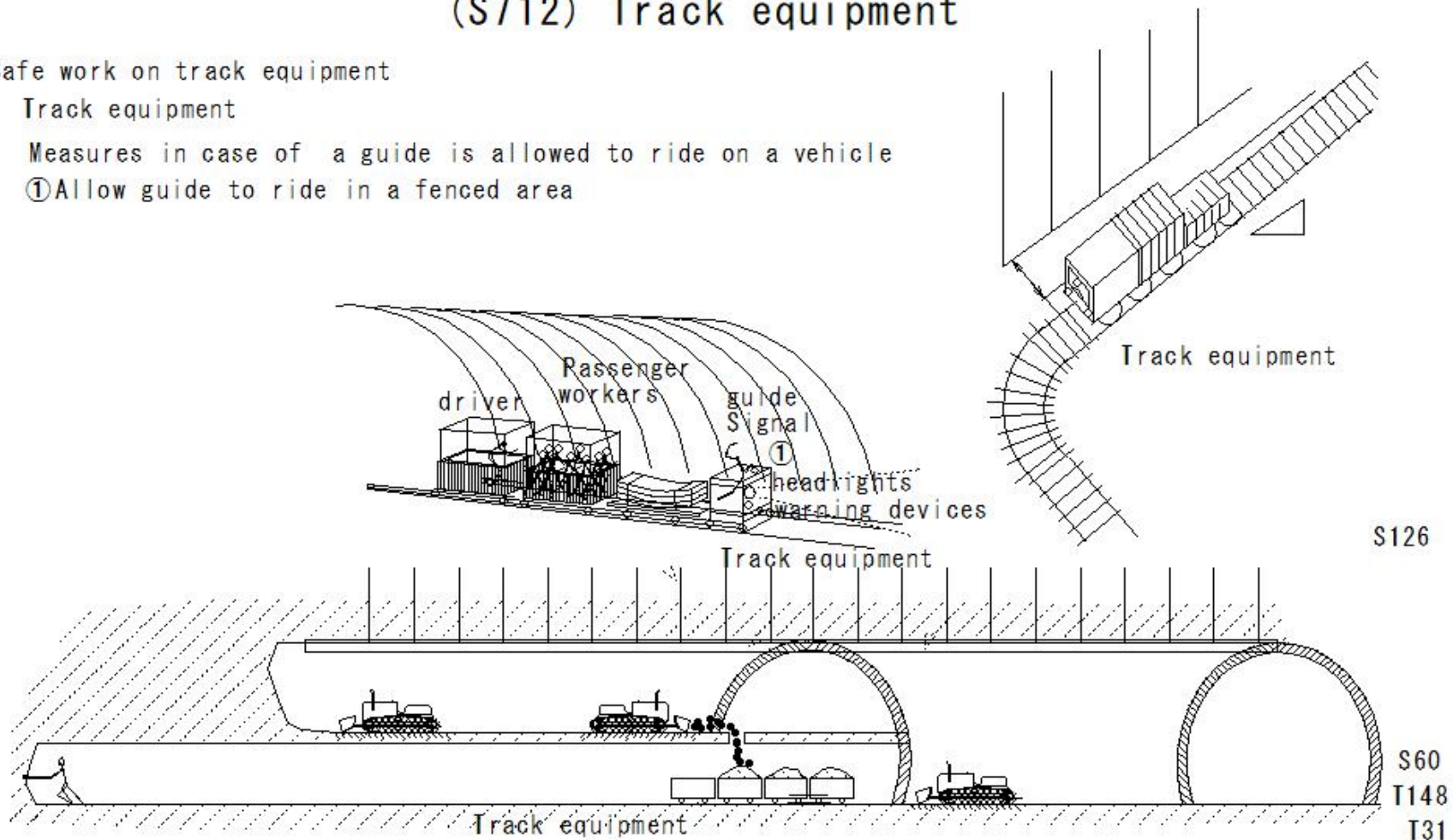
(S712) Track equipment

Safe work on track equipment

Track equipment

Measures in case of a guide is allowed to ride on a vehicle

① Allow guide to ride in a fenced area



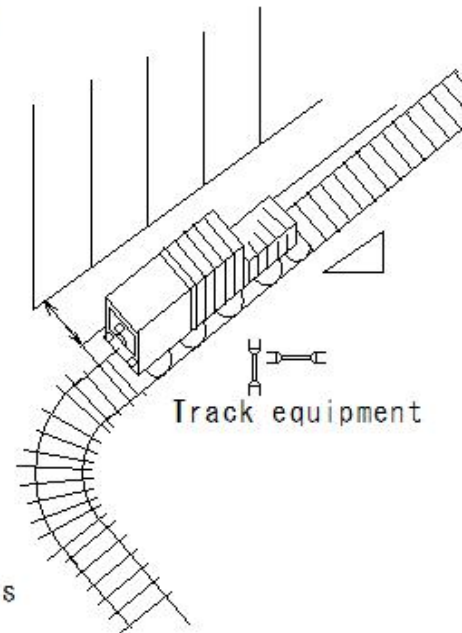
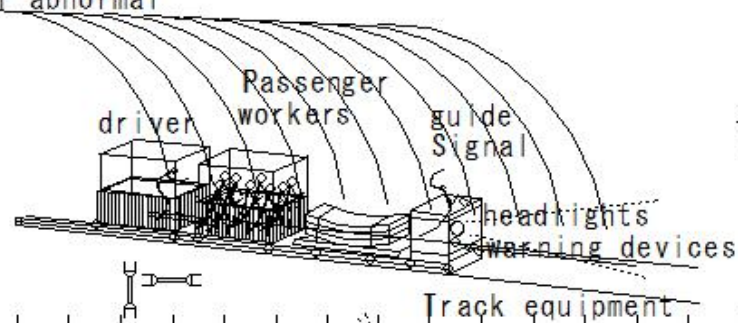
(S713) Track equipment

Safe work on track equipment

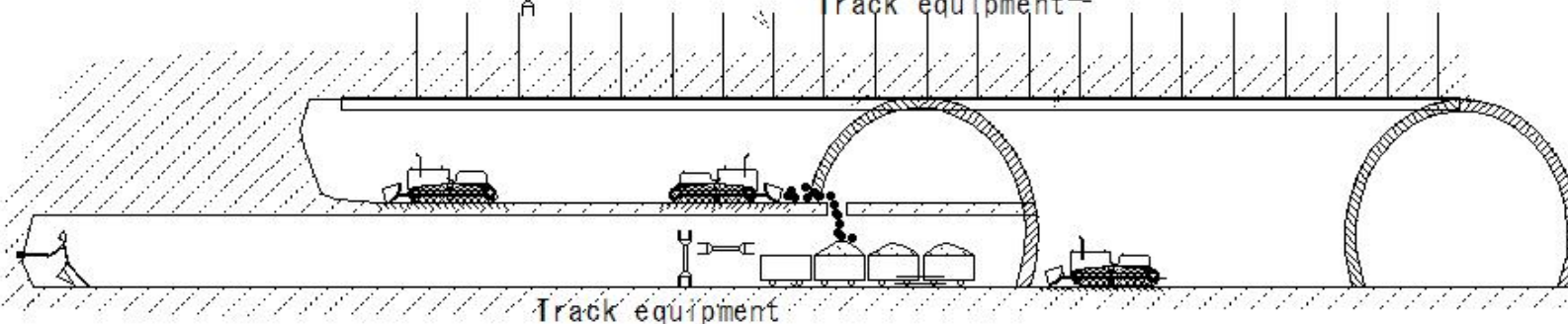
(S713) Track equipment

Regular voluntary inspection

- ① Every 3 years or more Once every day
- ② Once within a year
- ③ Once within a month
- ④ Keep for 3 years
- ⑤ Inspect before work starts... before work starts that day
- ⑥ Repair immediately if abnormal



S126



S60
T148
T31

(S714) Track equipment

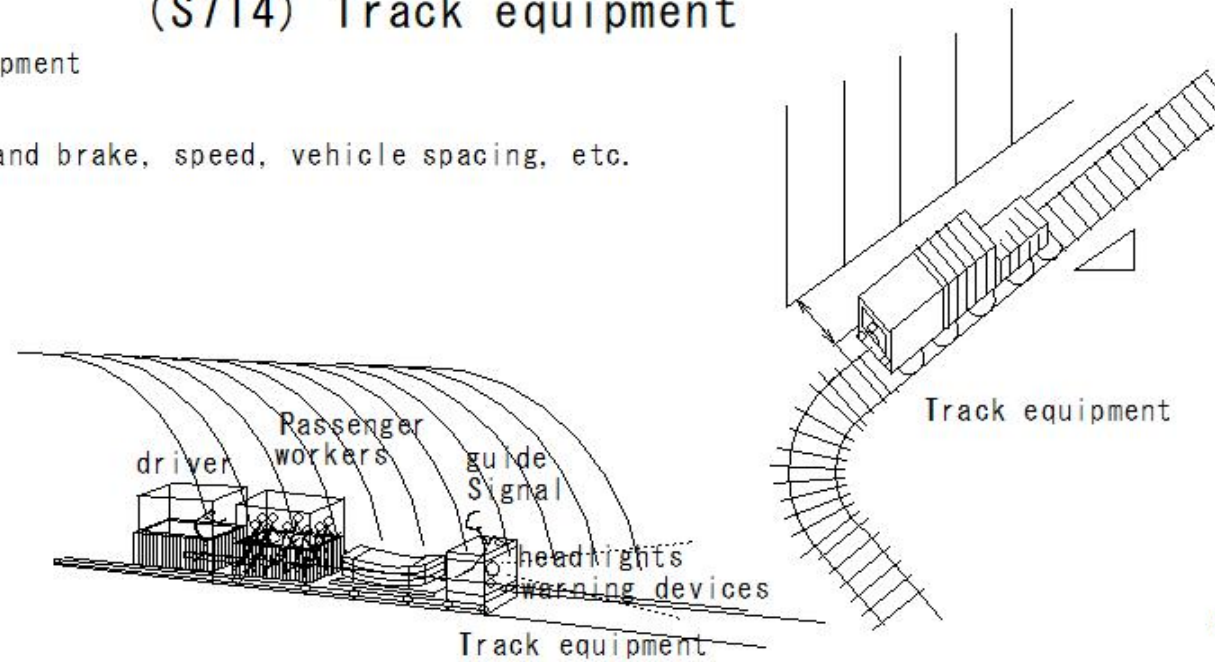
(S714) Track equipment

Safe work on track equipment

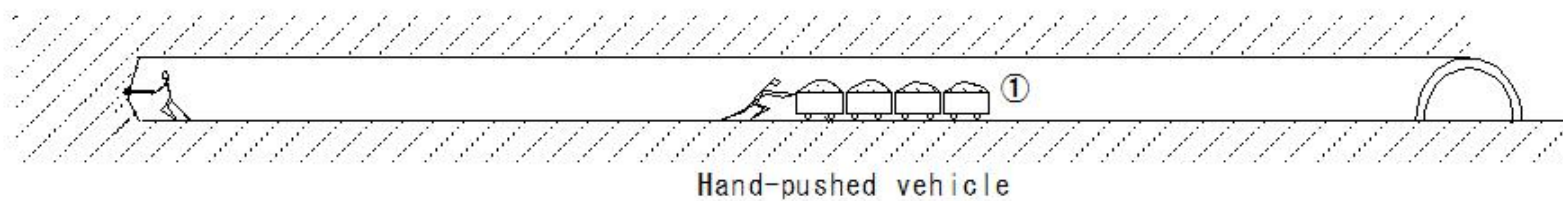
Hand-pushed vehicle

① Regulate track, hand brake, speed, vehicle spacing, etc.

Inspection OK



S126



S128

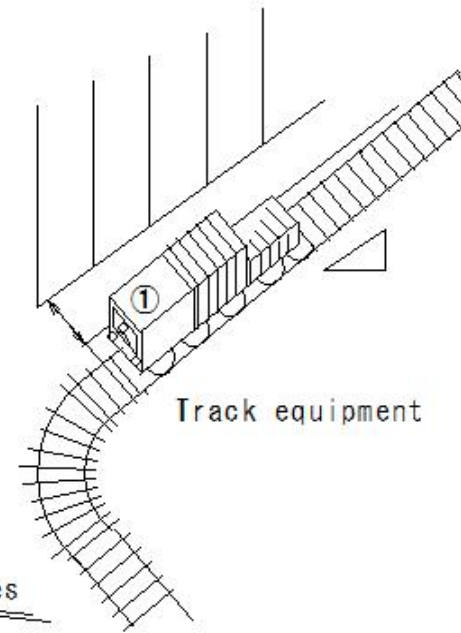
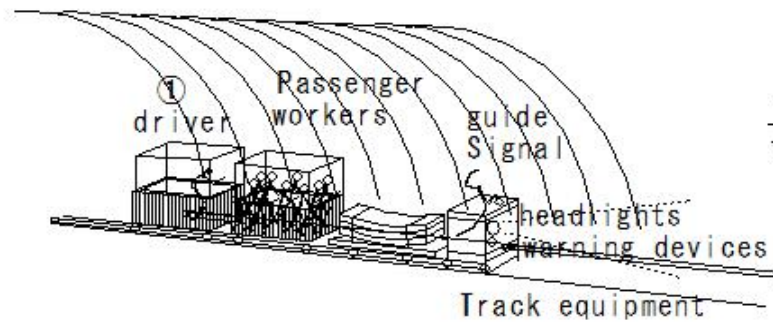
(S715) Track equipment

(S715) Track equipment

Safe work on track equipment

Driving qualifications

① Driving a motor vehicle... Special training completed



S126



S128

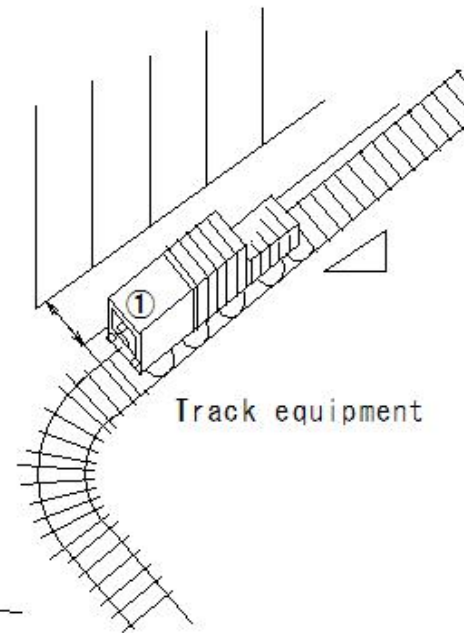
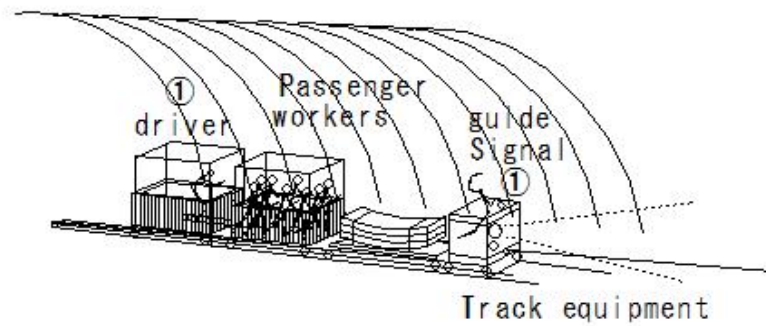
(S716) Track equipment

(S716) Track equipment

Safe work on track equipment

Signals

- ① Determine and publicize signaling methods



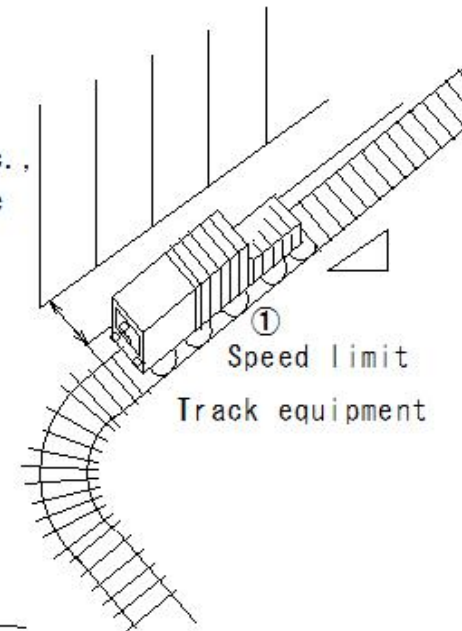
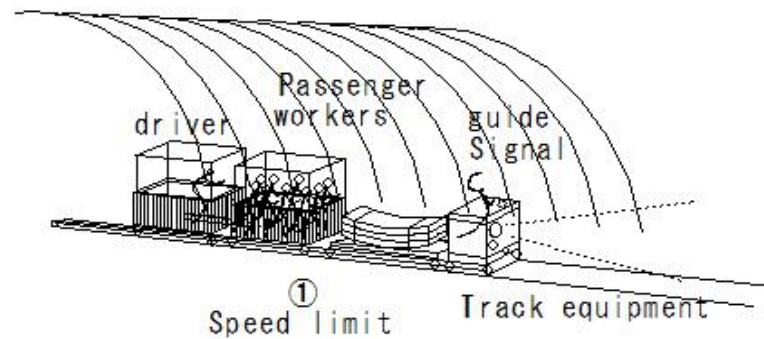
(S717) Track equipment

(S717) Track equipment

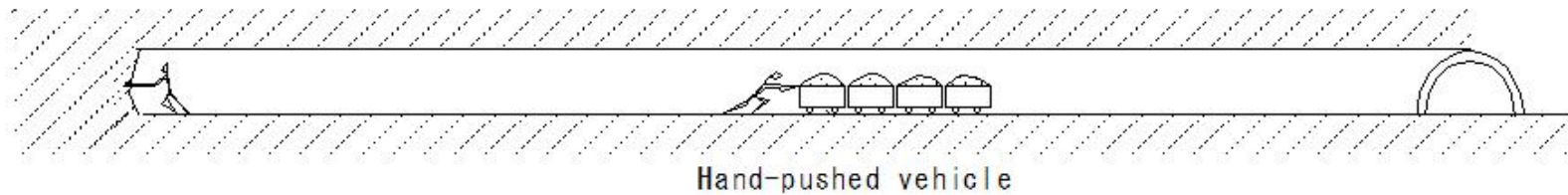
Safe work on track equipment

Speed limit

- ① Determine speed limits according to gradient, curve radius, etc., and allow drivers to drive



S126



S128

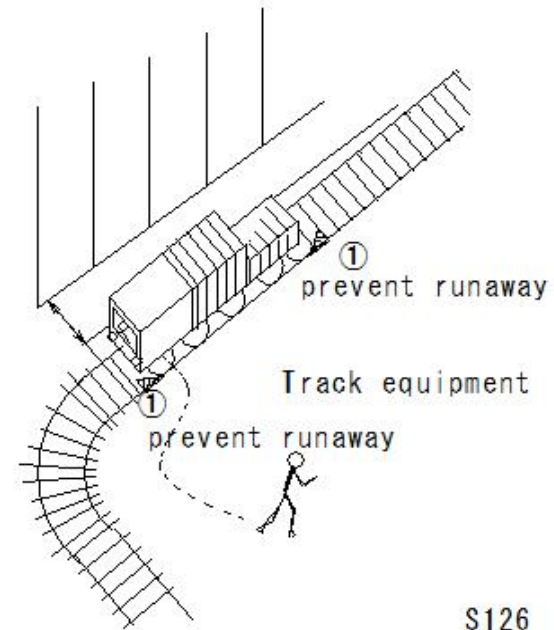
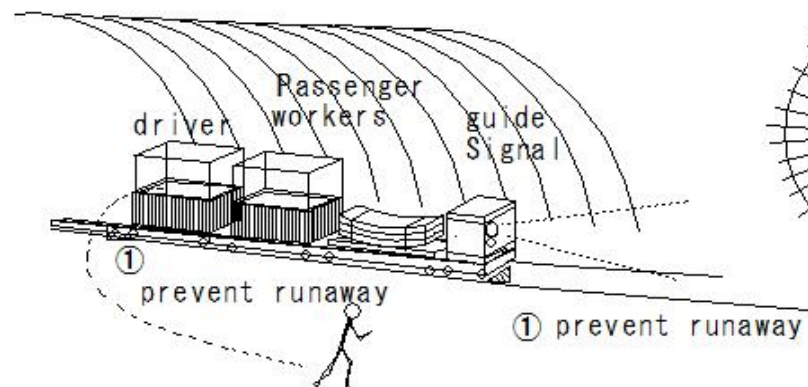
(S718) Track equipment

(S718) Track equipment

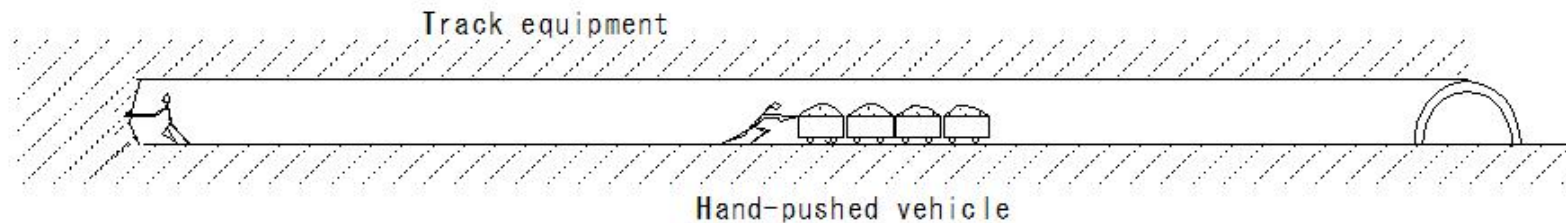
Safe work on track equipment

Measures to take when leaving driver's seat

- ① Apply brakes and take measures to prevent runaway



S126



S128

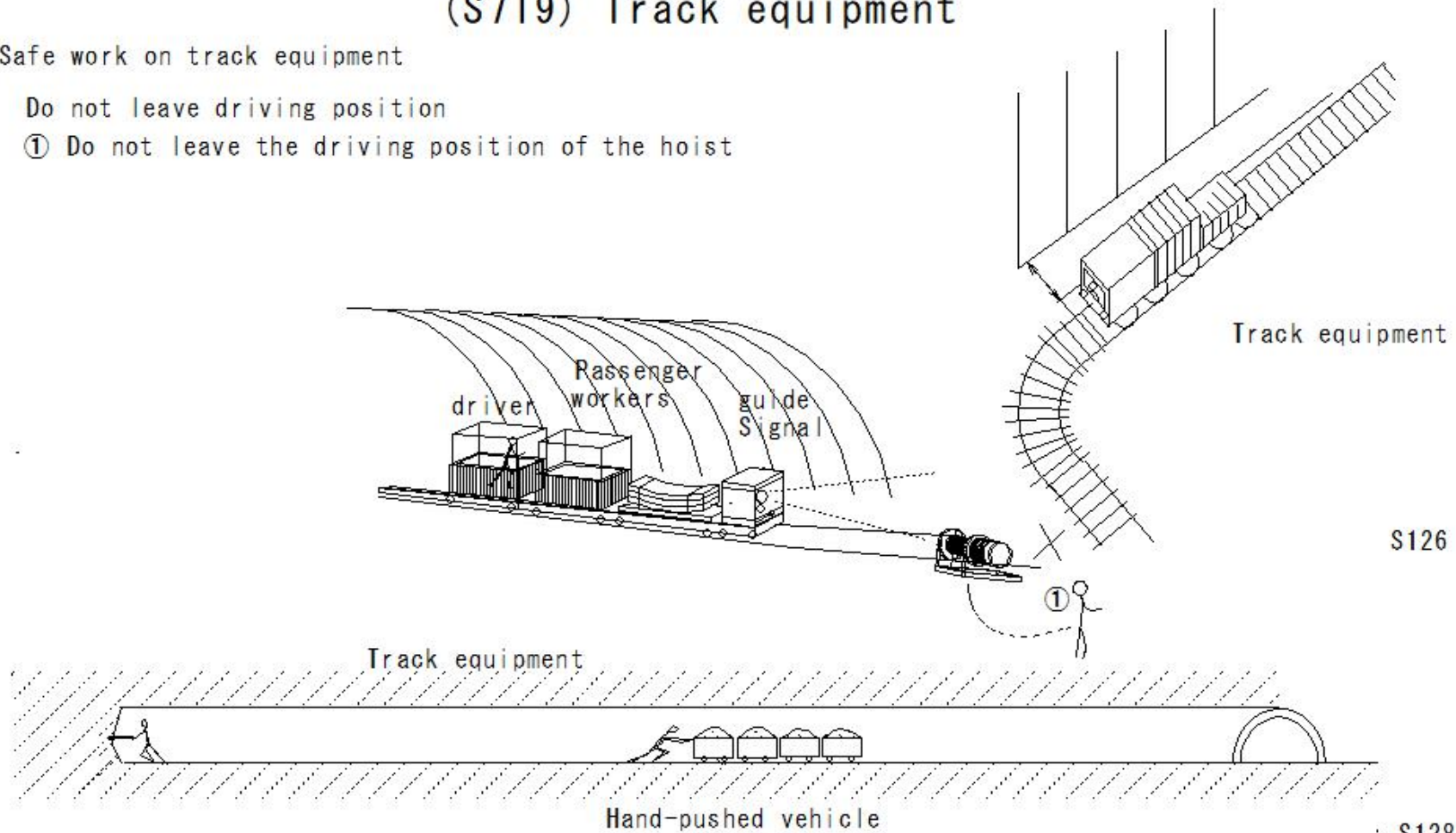
(S719) Track equipment

(S719) Track equipment

Safe work on track equipment

Do not leave driving position

- ① Do not leave the driving position of the hoist



S126

S128

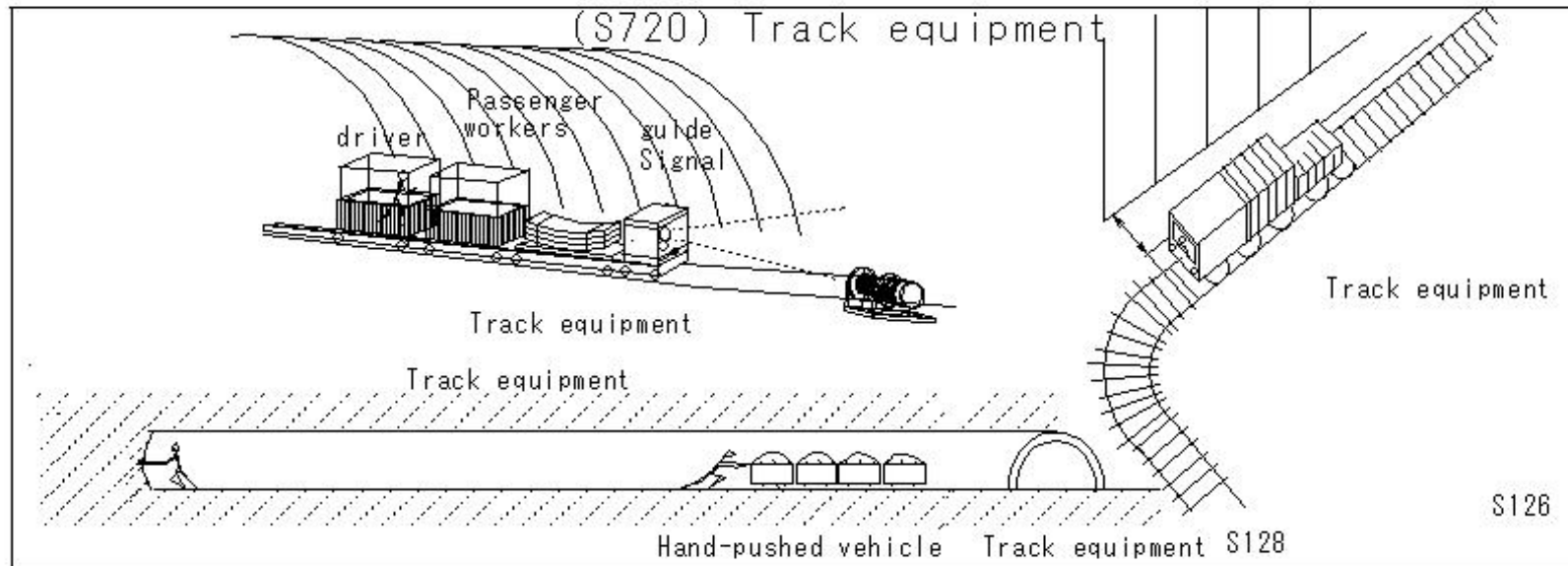
(S720) Track equipment

(S720) Track equipment

Standards for track equipment

Weight of rail

Vehicle weight	Rail weight
Less than 5t	9kg/m or more
5t to 10t	12kg/m or more
10t to 15t	15kg/m or more
Over 15t	22kg/m or more



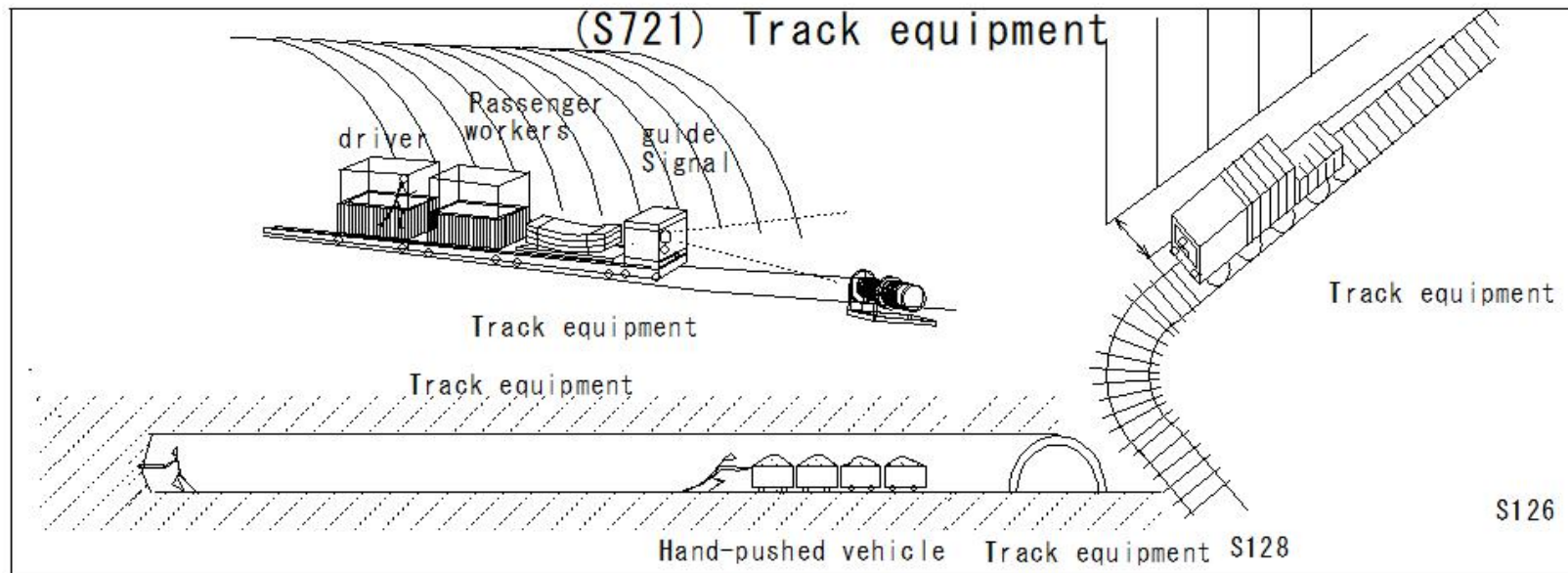
(S721) Track equipment

(S721) Track equipment

Standards for track equipment

Standard track structure by locomotive and trolley

Locomotive used (t)	Trolley used (m3)	Gauge (mm)	Rail (kg/m)	Sleeper size (cmxcmxm)
12~15	8	914	30	17x14x1.5
10~12	6	762.914	30	"
8~10	4.5	762.914	22~30	15x12x1.3
6~8	3	762	22	"
6 or less	3 or less	610.762	15	"

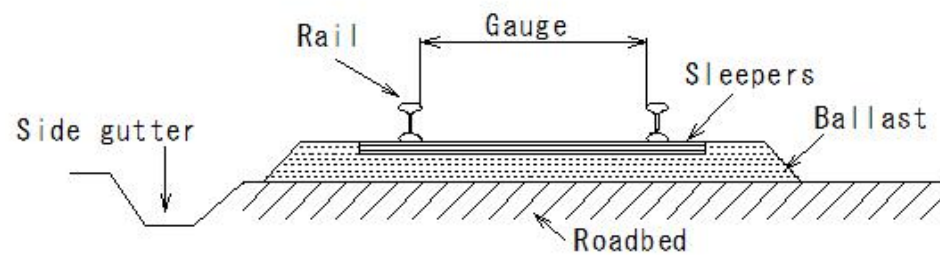
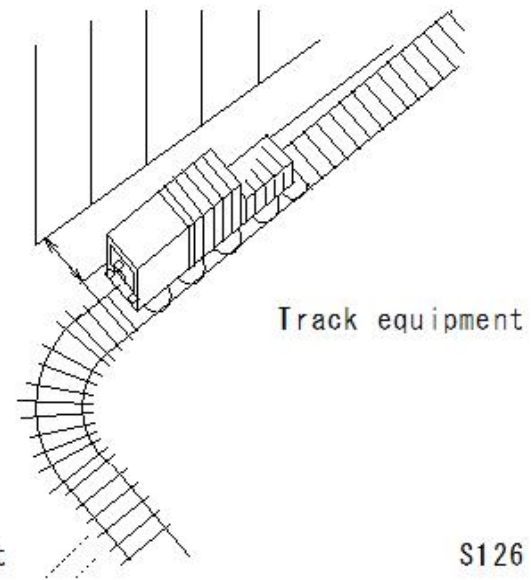
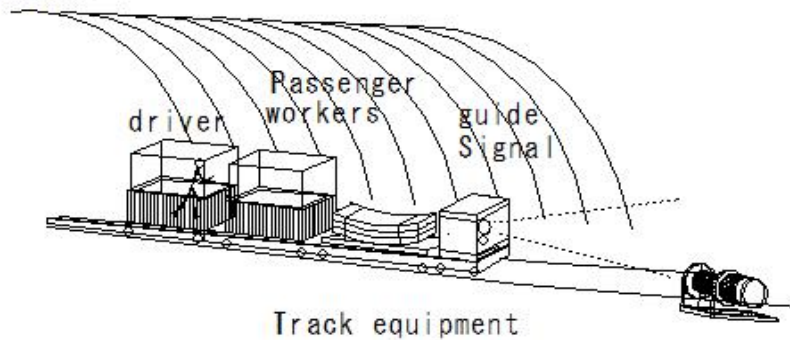


(S722) Track equipment

(S722) Track equipment

Standards for track equipment

Rail joint plate



S126

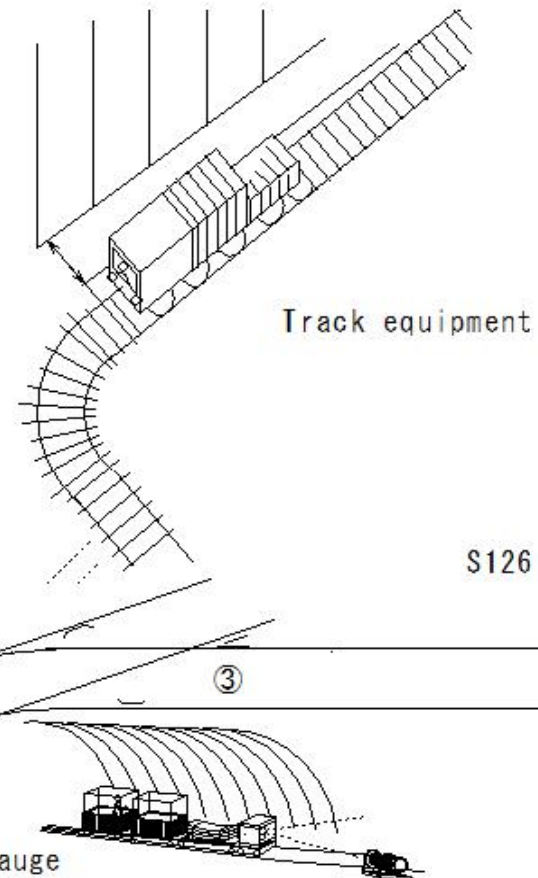
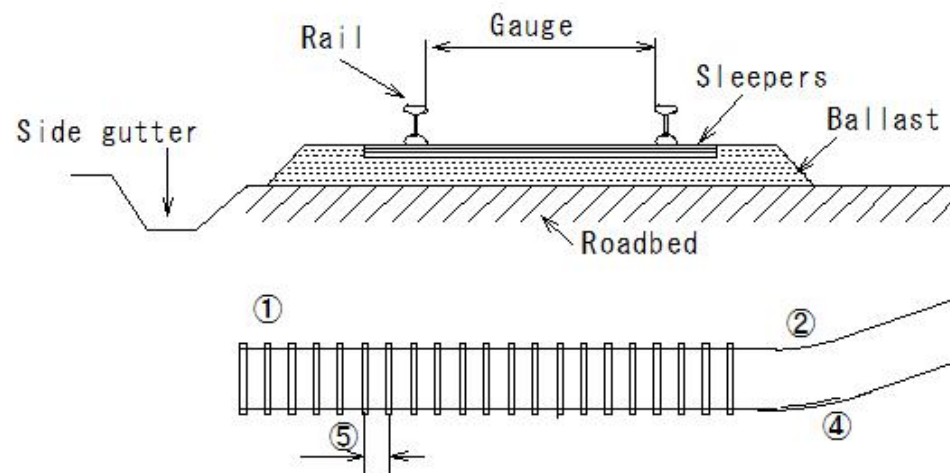
(S723) Track equipment

(S723) Track equipment

Standards for track equipment

Rail joint plate

- ① The gradient must be 50/1000 or less in sections where powered cars are used.
- ② The curve radius must be 10m or more.
- ③ Switches must have functioning switches.
- ④ The curve radius must be 10m or more.
- ⑤ The spacing between sleepers must be 0.75m or less.



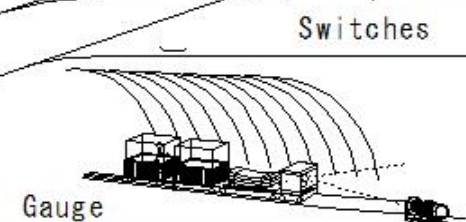
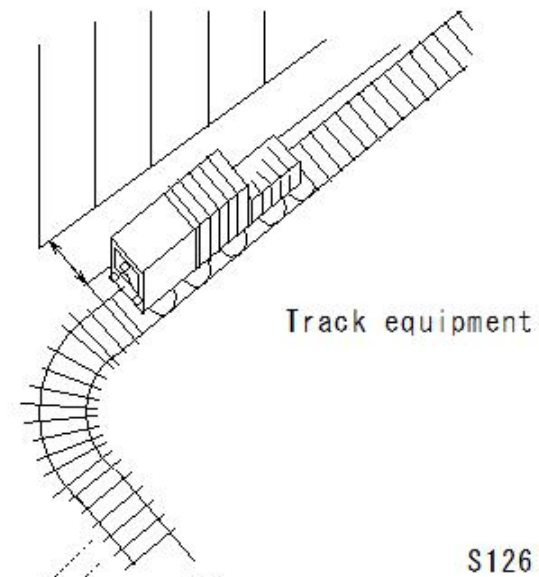
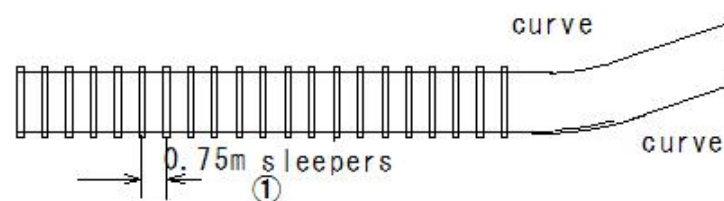
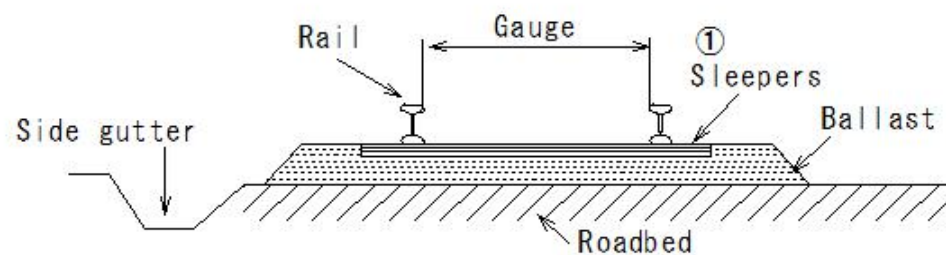
(S724) Track equipment

(S724) Track equipment

Standards for track equipment

Sleepers

- ① The layout and spacing will depend on the vehicle weight and the condition of the track bed.



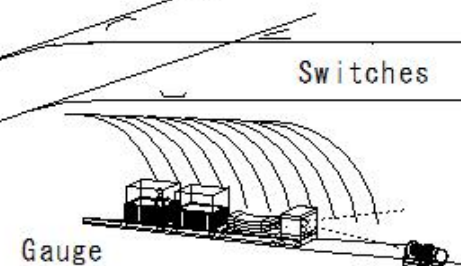
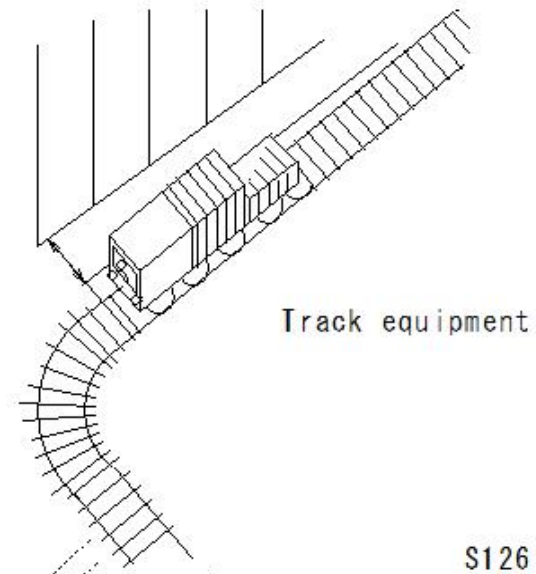
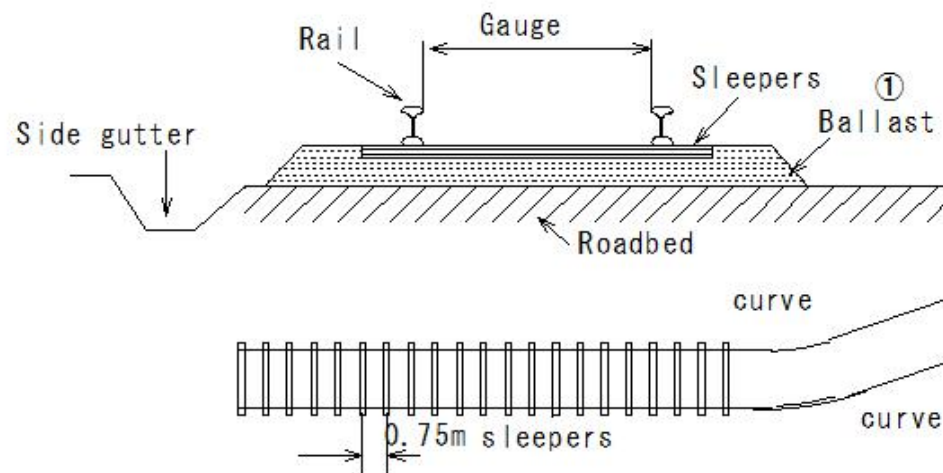
(S725) Track equipment

(S725) Track equipment

Standards for track equipment

Ballast

- ① For powered vehicles with a vehicle weight of 5t or more that have a trackbed made of crushed stone, etc., thoroughly compact and ensure good drainage

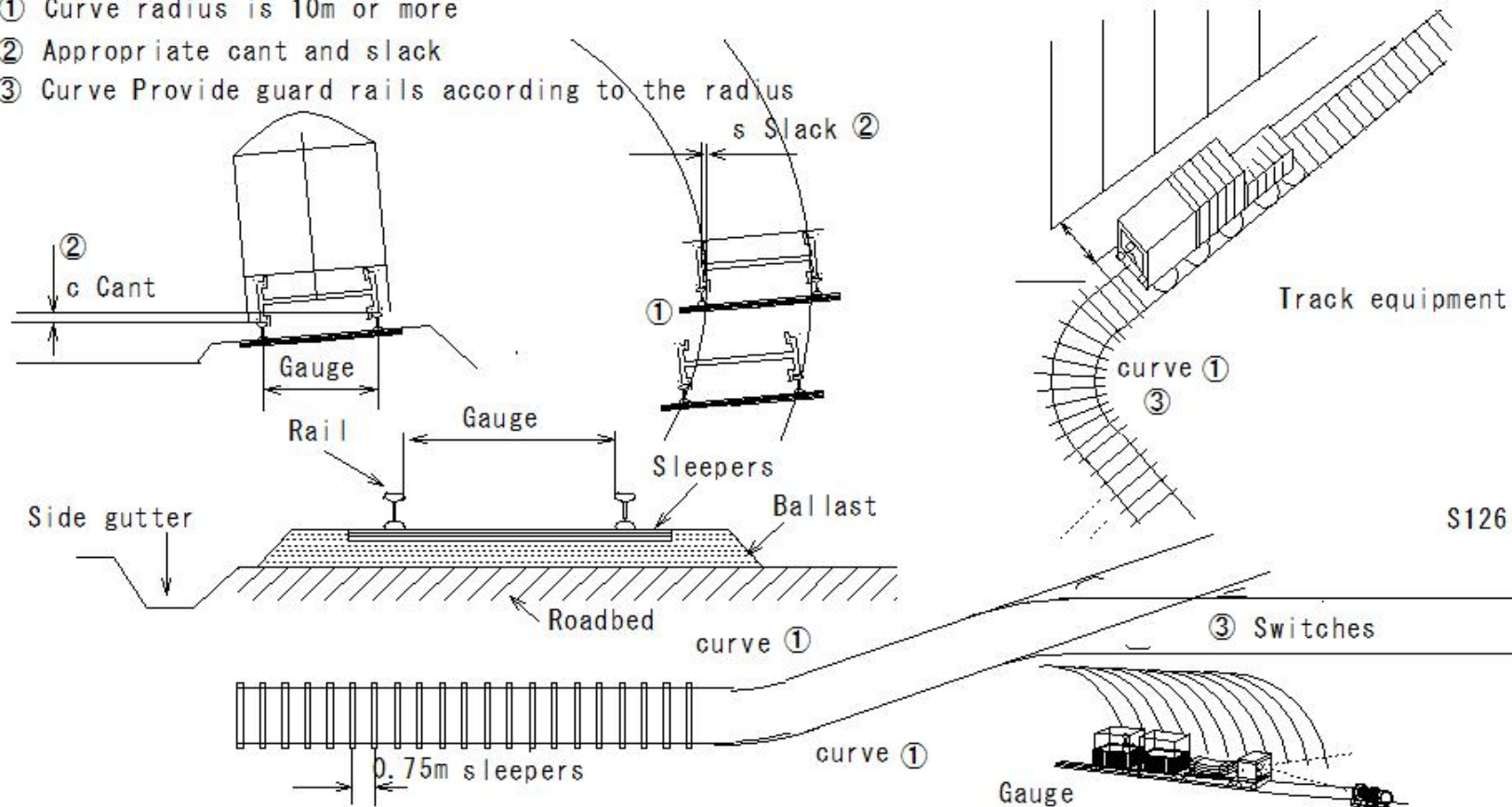


(S726) Track equipment

Standards for track equipment (S726) Track equipment

Curved section

- ① Curve radius is 10m or more
- ② Appropriate cant and slack
- ③ Curve Provide guard rails according to the radius



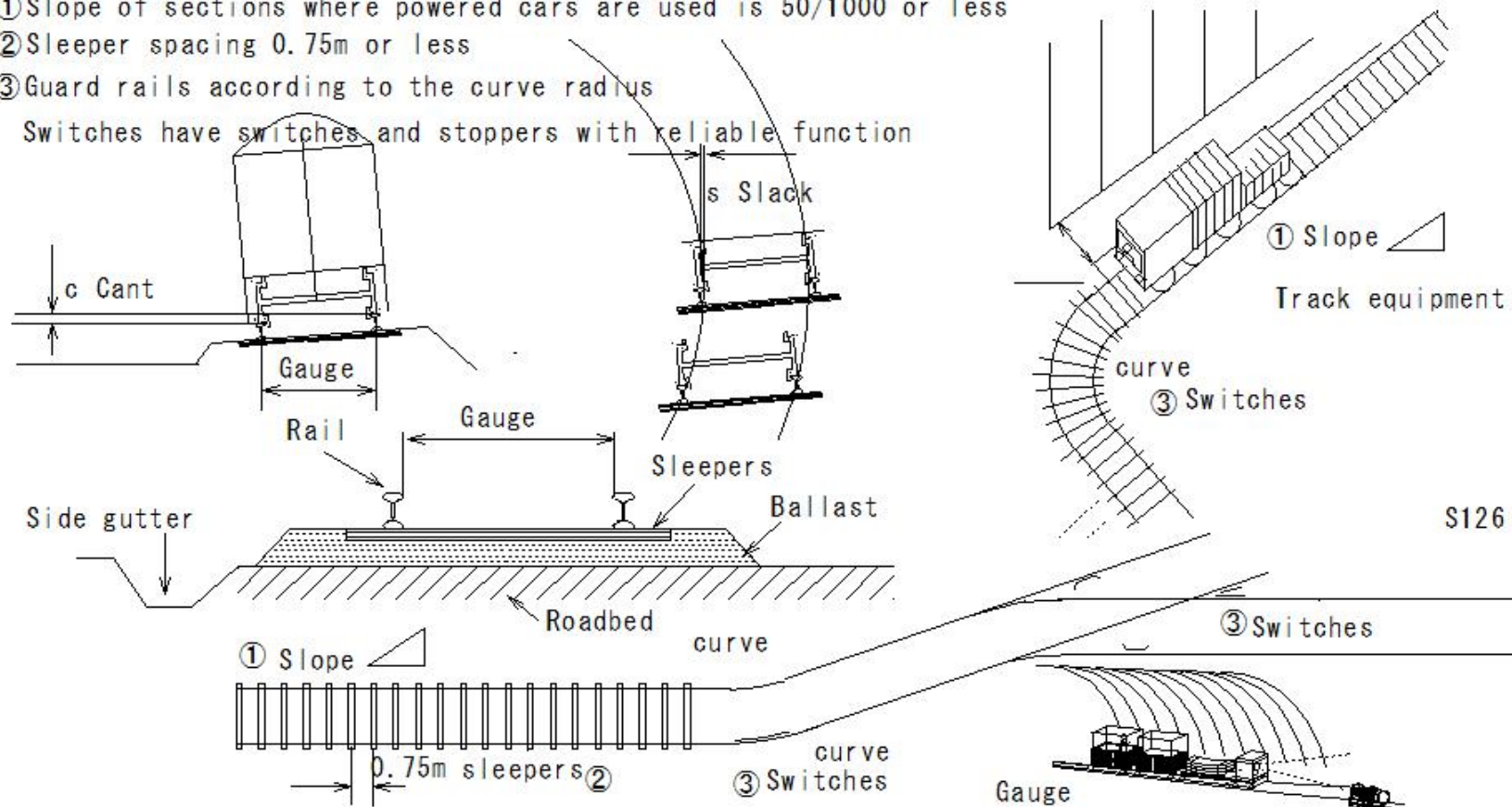
(S727) Track equipment

Standards for track equipment (S727) Track equipment

Slope of track

- ① Slope of sections where powered cars are used is 50/1000 or less
- ② Sleeper spacing 0.75m or less
- ③ Guard rails according to the curve radius

Switches have switches and stoppers with reliable function

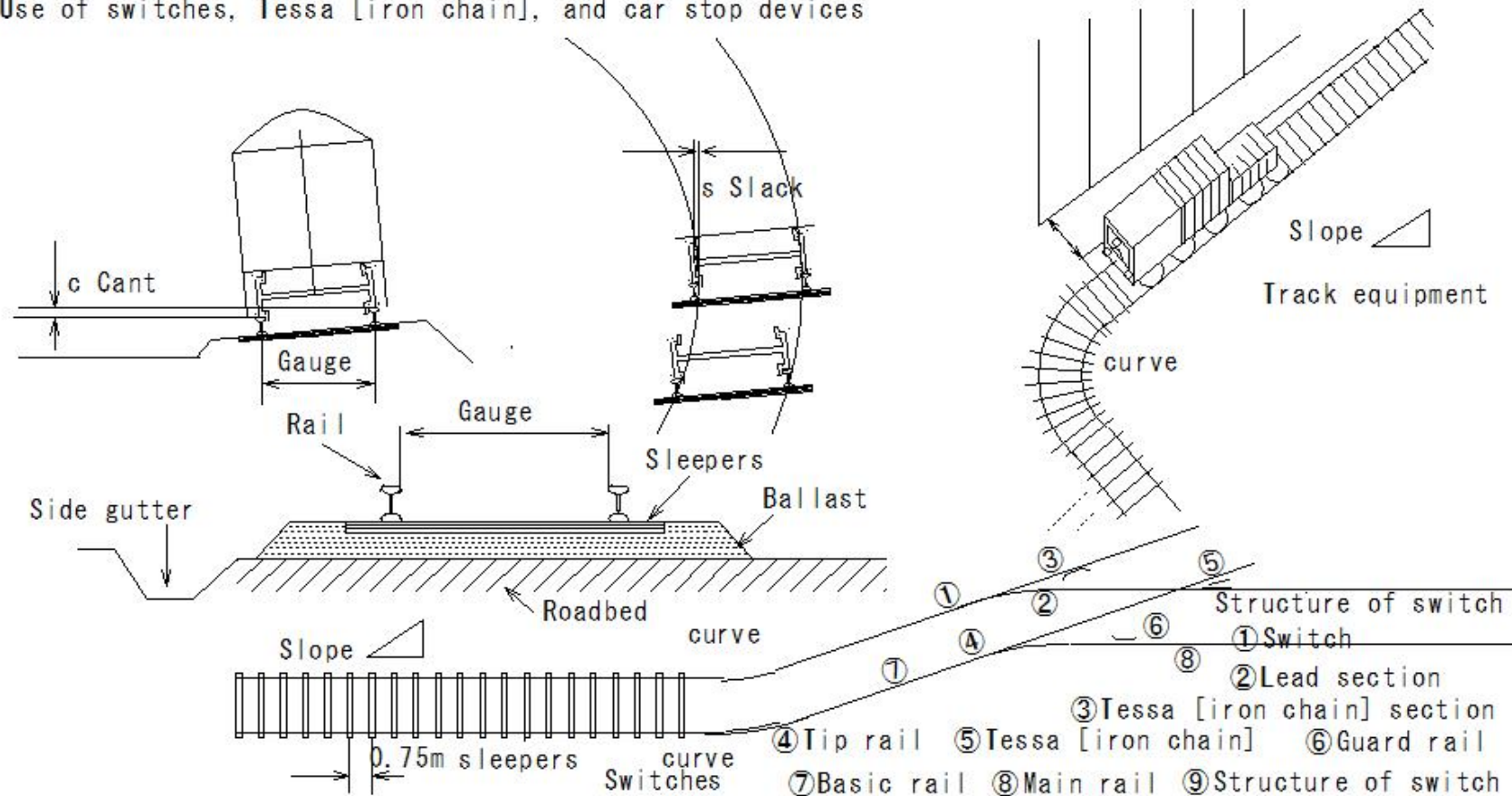


(S728) Track equipment

Standards for track equipment (S728) Track equipment

Track switch points, etc.

Use of switches, Tessa [iron chain], and car stop devices



(S729) Track equipment

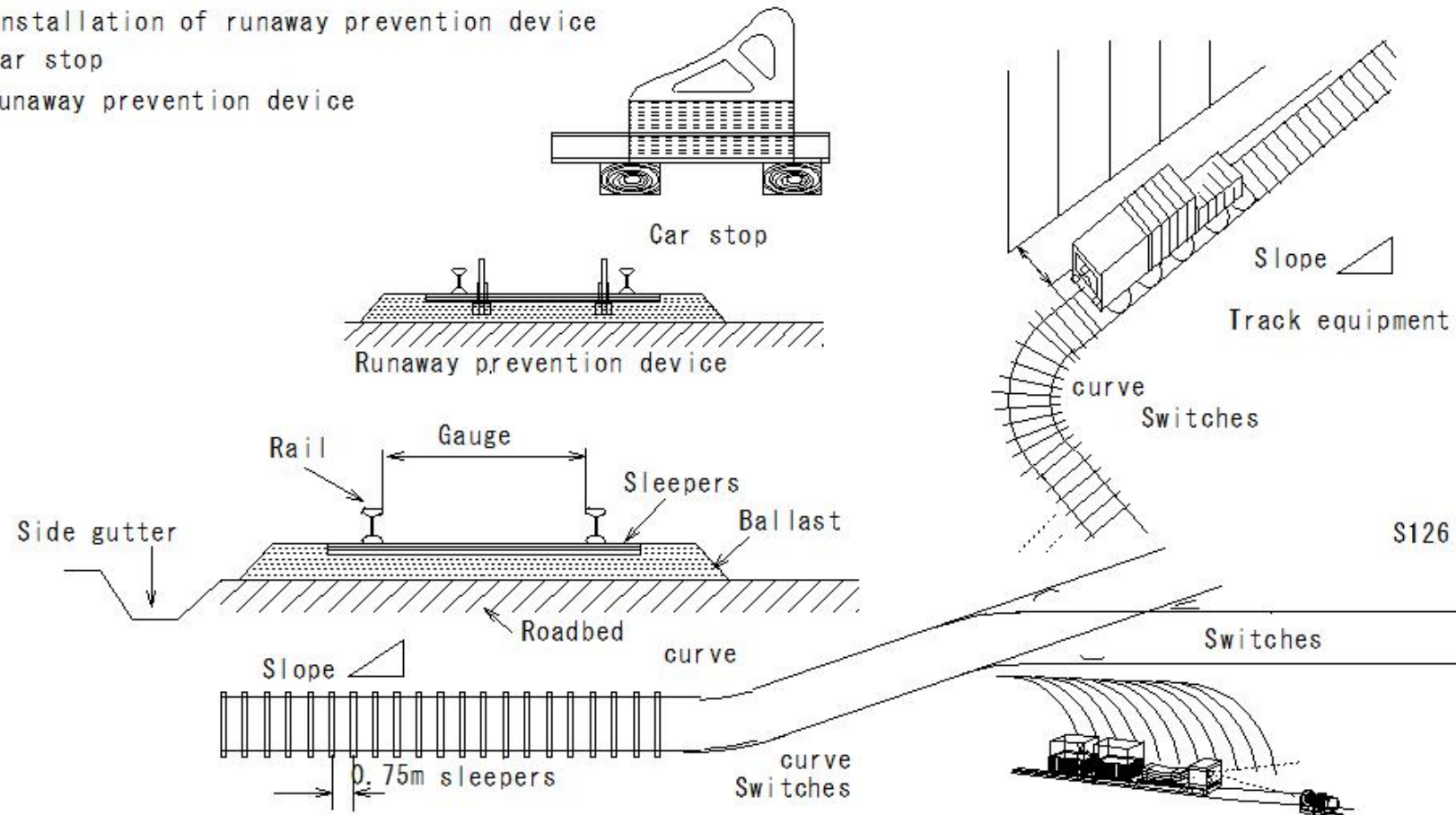
(S729) Track equipment

Standards for track equipment

Installation of runaway prevention device

Car stop

Runaway prevention device



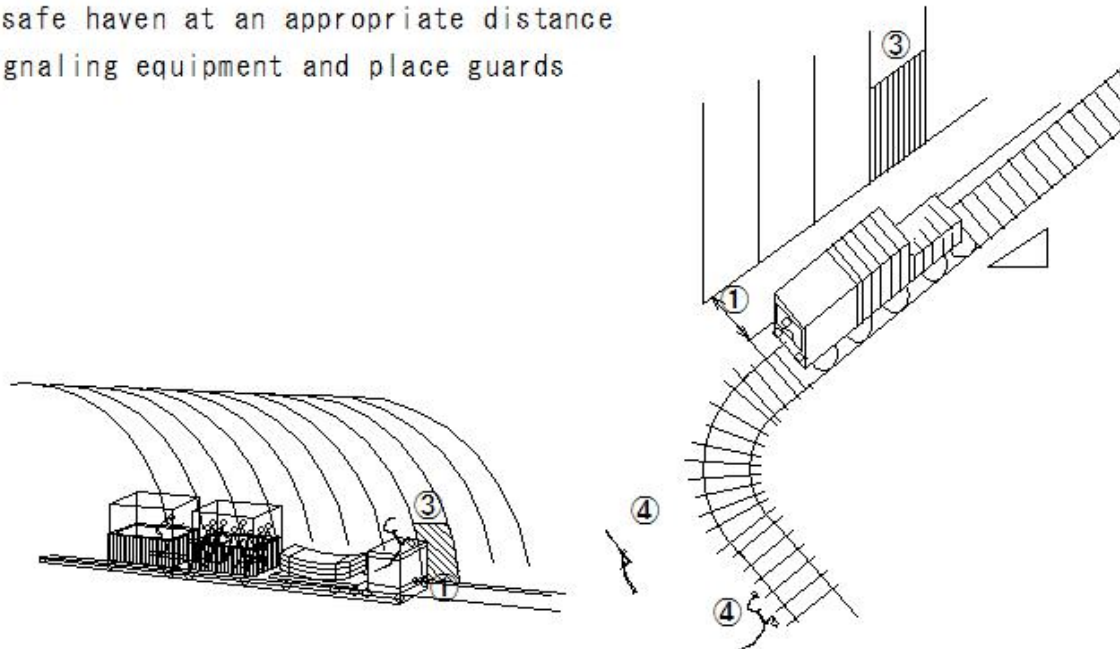
(S730) Track equipment

(S730) Track equipment

Equipment management for vehicles, motor vehicles, etc.

Distance between vehicle and side walls, etc.

- ① A distance of at least 0.6m
- ② If difficult, take one of the following measures
- ③ Install a safe haven at an appropriate distance
- ④ Install signaling equipment and place guards



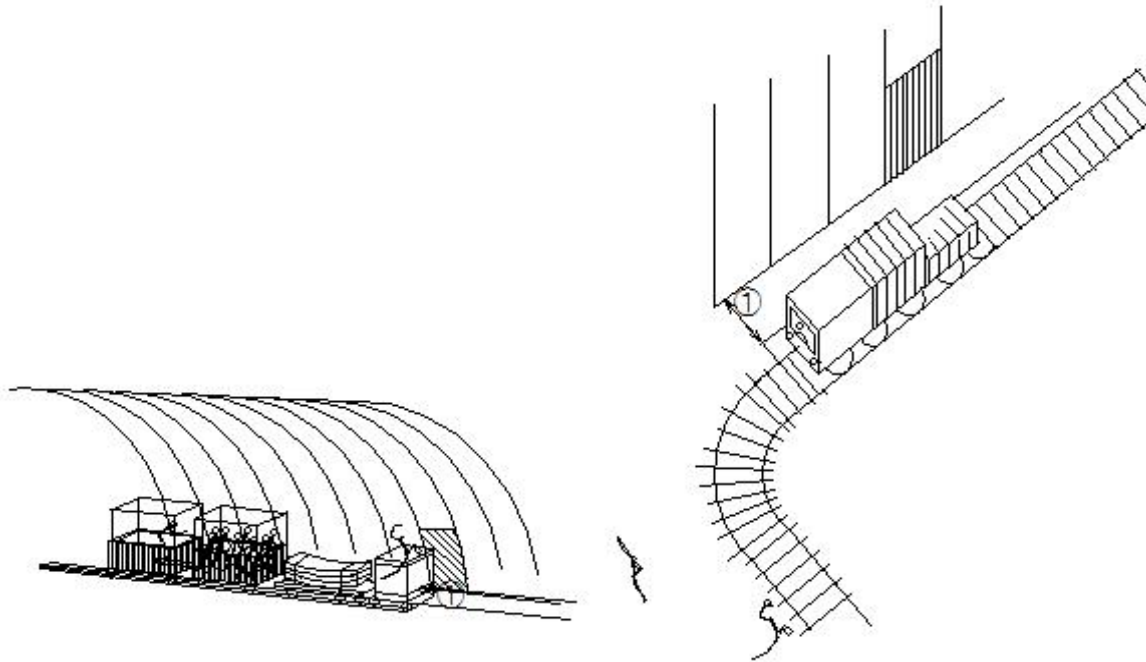
(S731) Track equipment

(S731) Track equipment

Equipment management for vehicles, motor vehicles, etc.

Preventive measures for vehicle occupants

- ① Maintain the necessary distance between the vehicle and side walls, etc.



S126

(S732) Track equipment

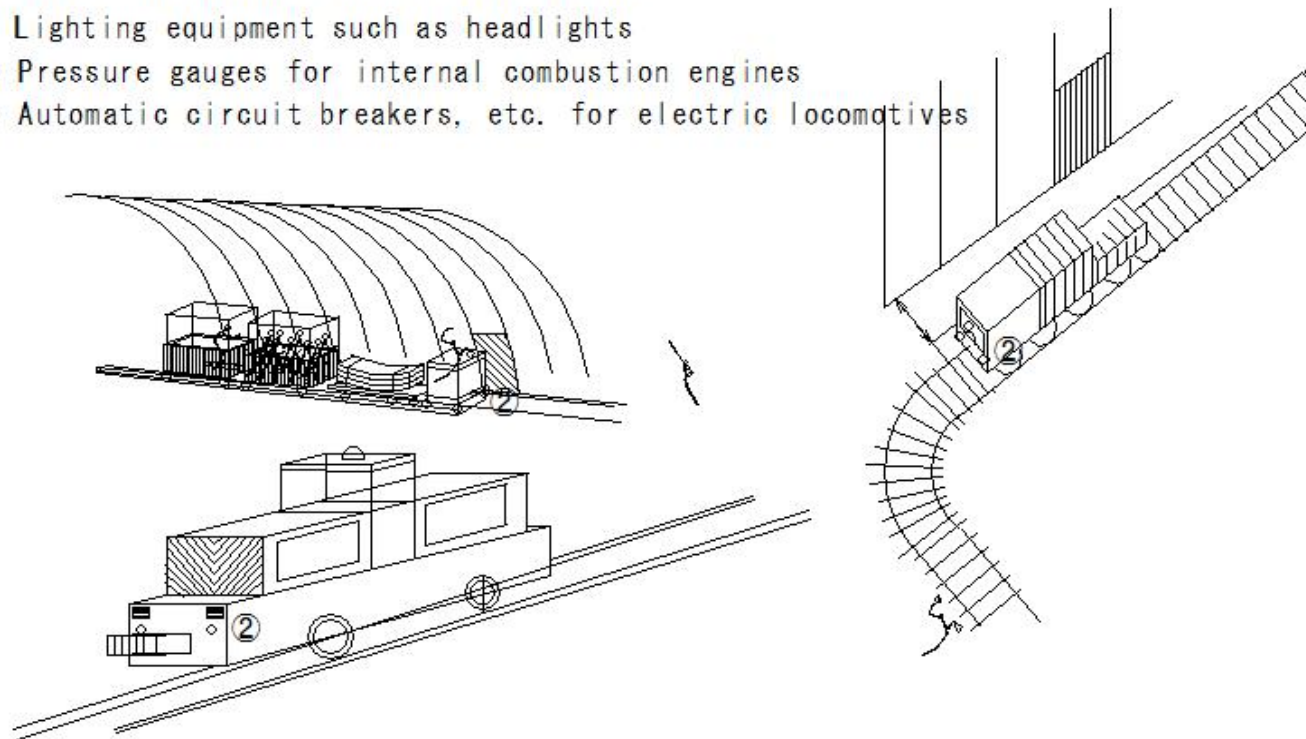
(S732) Track equipment

Equipment management for vehicles, motor vehicles, etc.

Signaling equipment

Equipment for motor vehicles

- ① Signaling devices such as alarm bells
- ② Lighting equipment such as headlights
- ③ Pressure gauges for internal combustion engines
- ④ Automatic circuit breakers, etc. for electric locomotives



S126

(S733) Track equipment

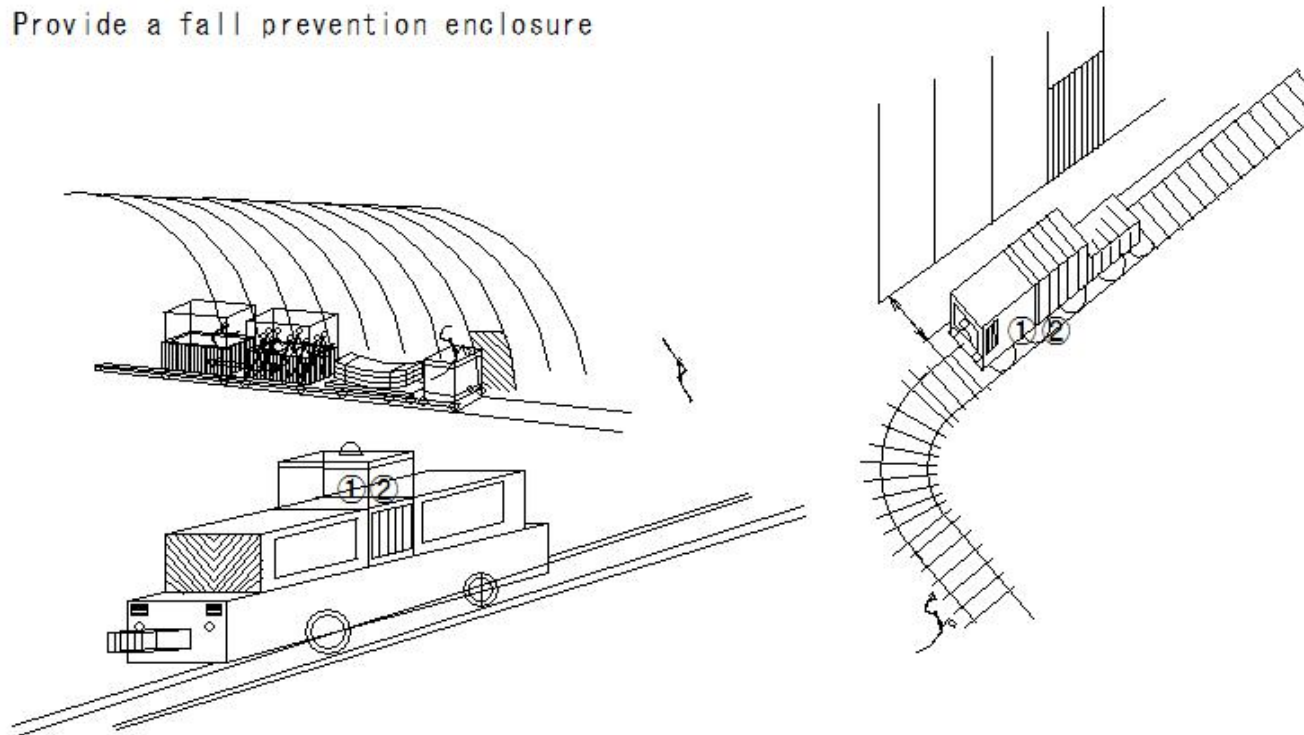
(S733) Track equipment

Equipment management for vehicles, motor vehicles, etc.

Signal equipment

Driver's seat

- ① Structure with good visibility
- ② Provide a fall prevention enclosure



S126

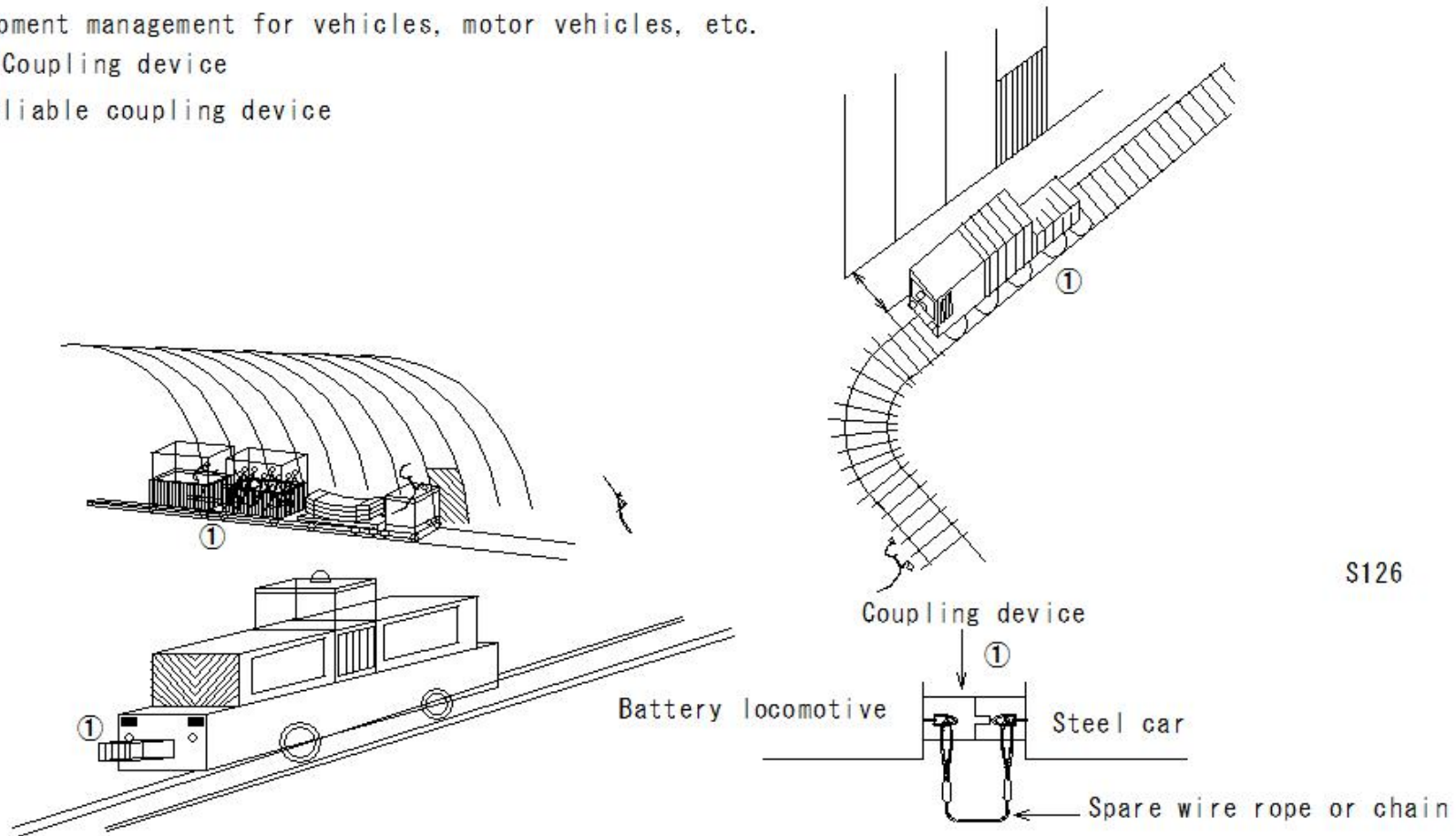
(S734) Track equipment

(S734) Track equipment

Equipment management for vehicles, motor vehicles, etc.

① Coupling device

Reliable coupling device



(S735) Track equipment

(S735) Track equipment

Equipment management for vehicles, motor vehicles, etc.

Motorized vehicle brakes

① Equipped with hand brakes

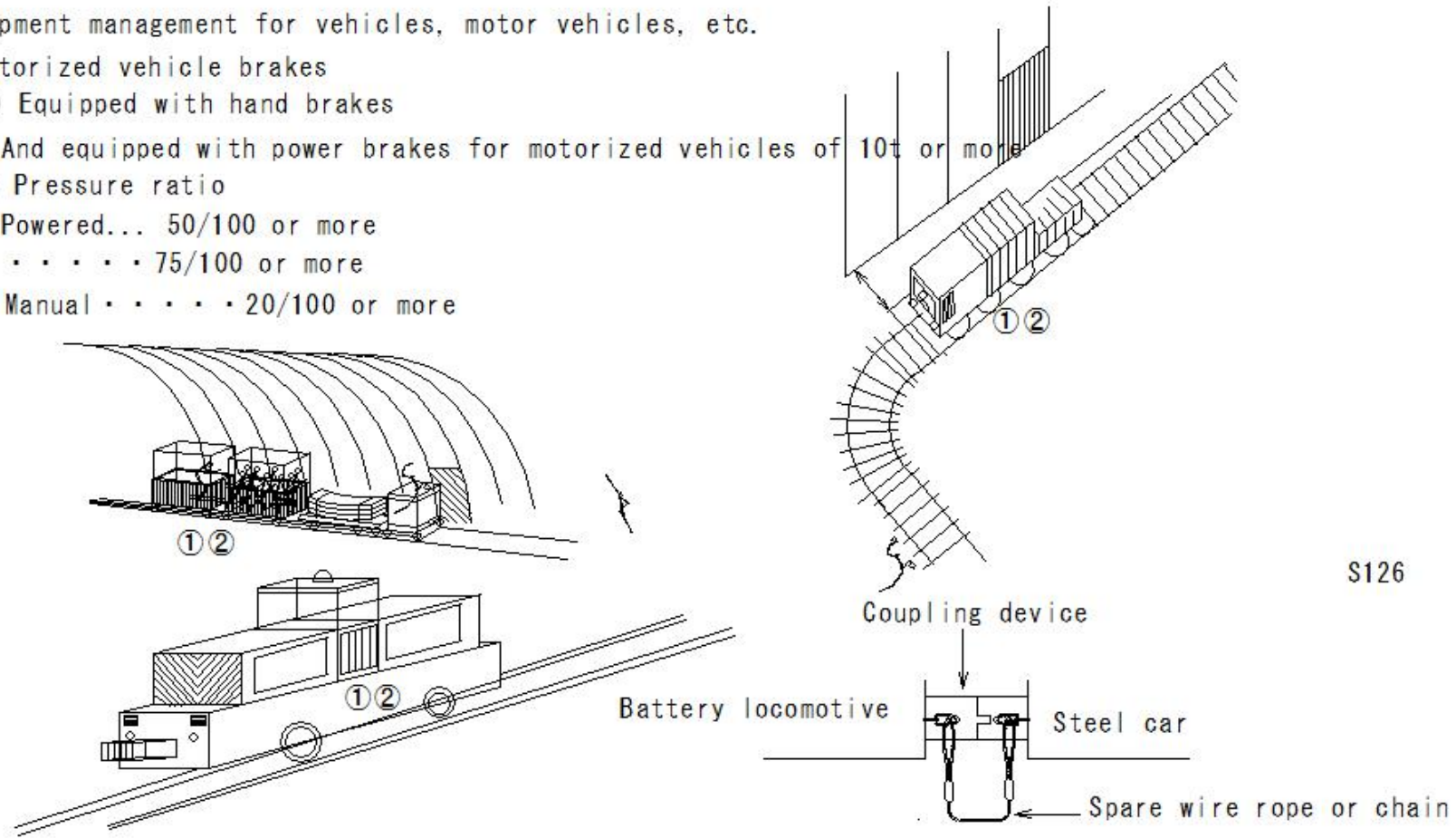
And equipped with power brakes for motorized vehicles of 10t or more

② Pressure ratio

Powered... 50/100 or more

• • • • • 75/100 or more

Manual • • • • • 20/100 or more

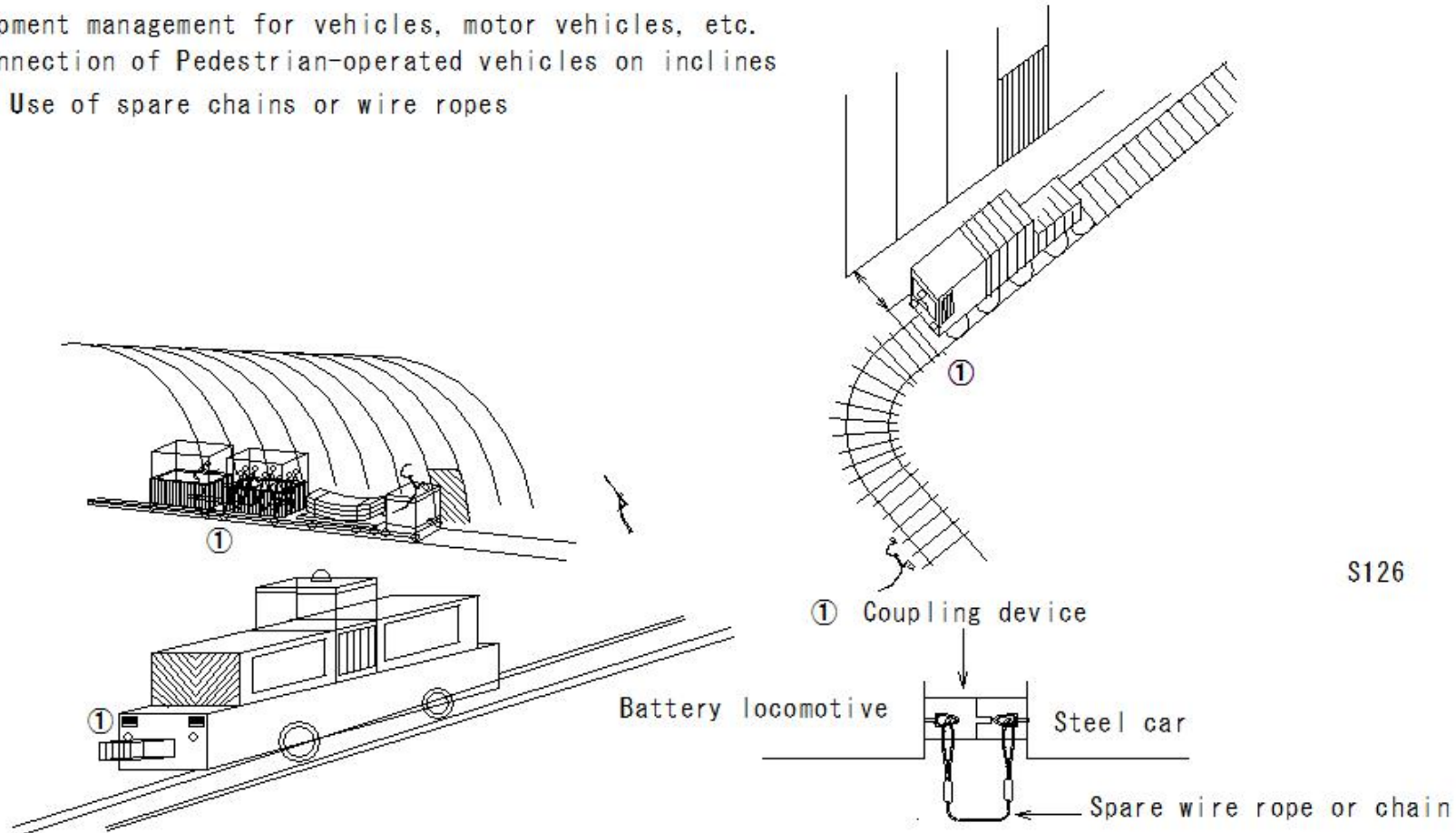


(S736) Track equipment

(S736) Track equipment

Equipment management for vehicles, motor vehicles, etc.
Connection of Pedestrian-operated vehicles on inclines

① Use of spare chains or wire ropes



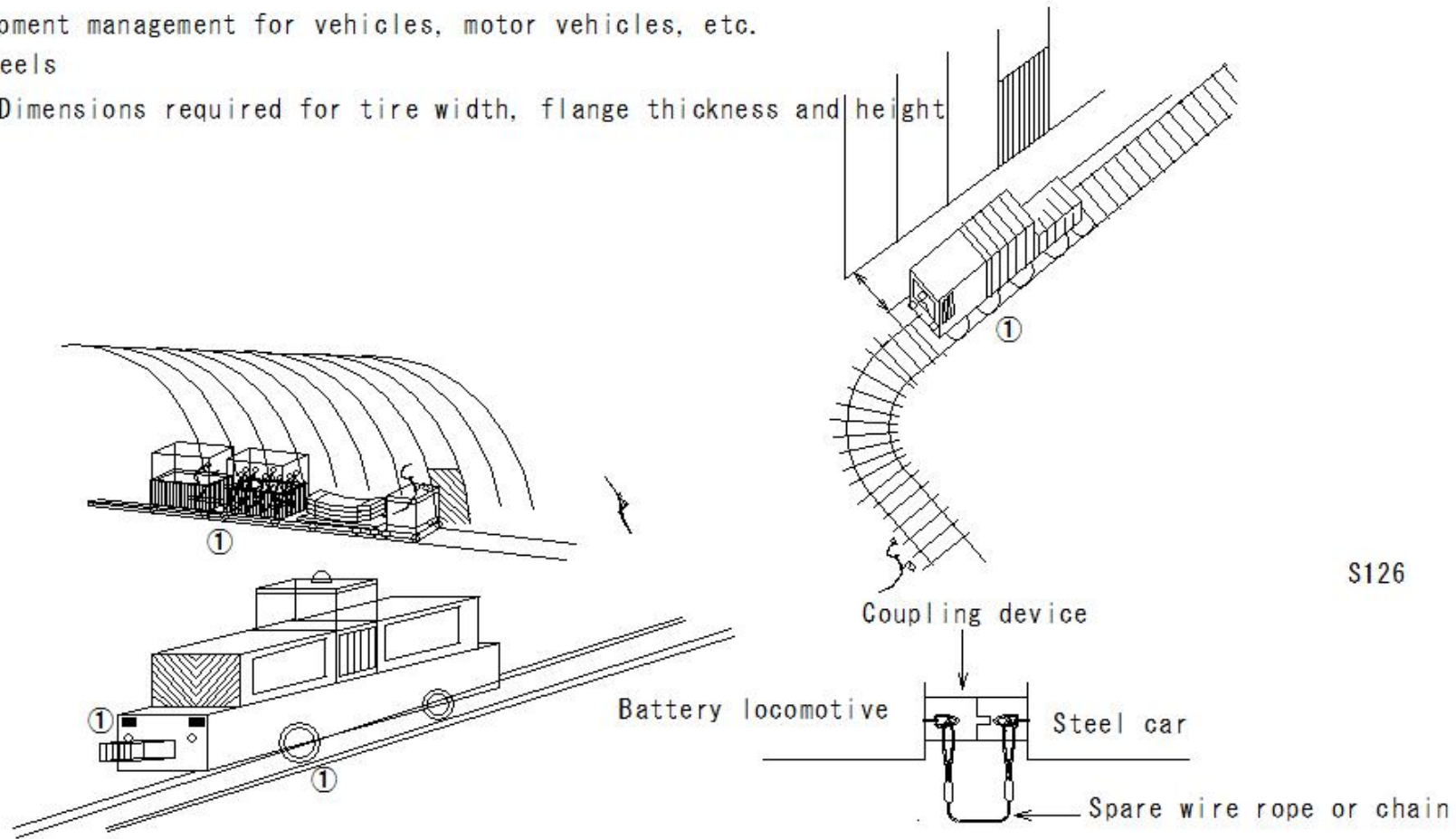
(S737) Track equipment

(S737) Track equipment

Equipment management for vehicles, motor vehicles, etc.

Wheels

① Dimensions required for tire width, flange thickness and height



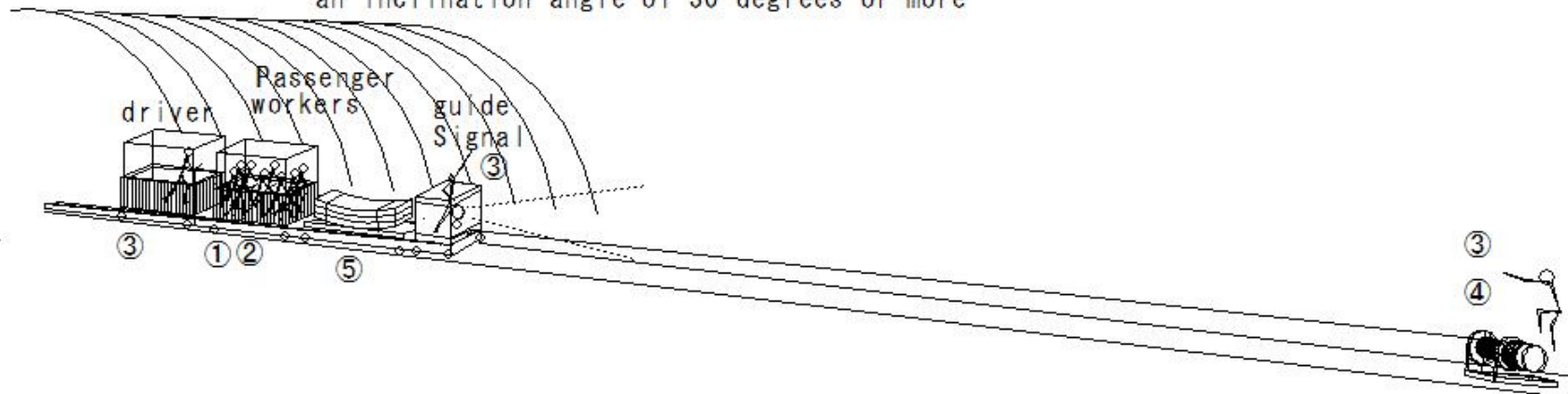
(S738) Track equipment

(S738) Track equipment

Equipment management of vehicles, powered cars, etc.

Equipment for handcars

- ① Seats, handrails
- ② Enclosures and boarding/alighting doors
- ③ For handcars using a hoisting device on a slope,
Communication equipment between the hoisting device driver and passengers
- ④ Emergency stop device for the hoisting device
- ⑤ Derailment prevention device for slopes with
an inclination angle of 30 degrees or more



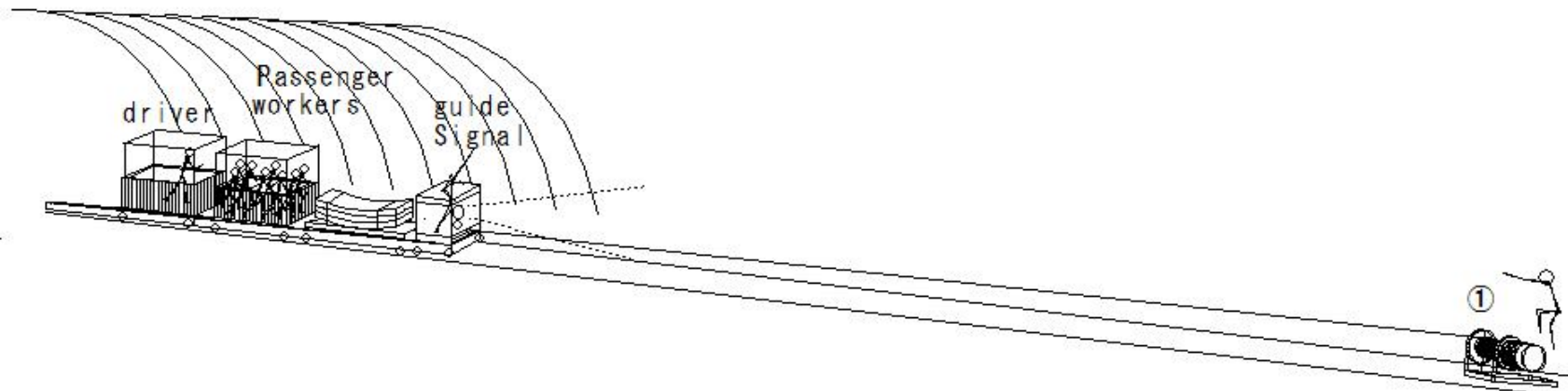
S719-S722

(S739) Track equipment

(S739) Track equipment

Equipment management of vehicles, motor vehicles, etc.

① Equipment for brakes on hoisting devices



S719-S722

(S740) Track equipment

(S740) Track equipment

Equipment management of vehicles, motor vehicles, etc.

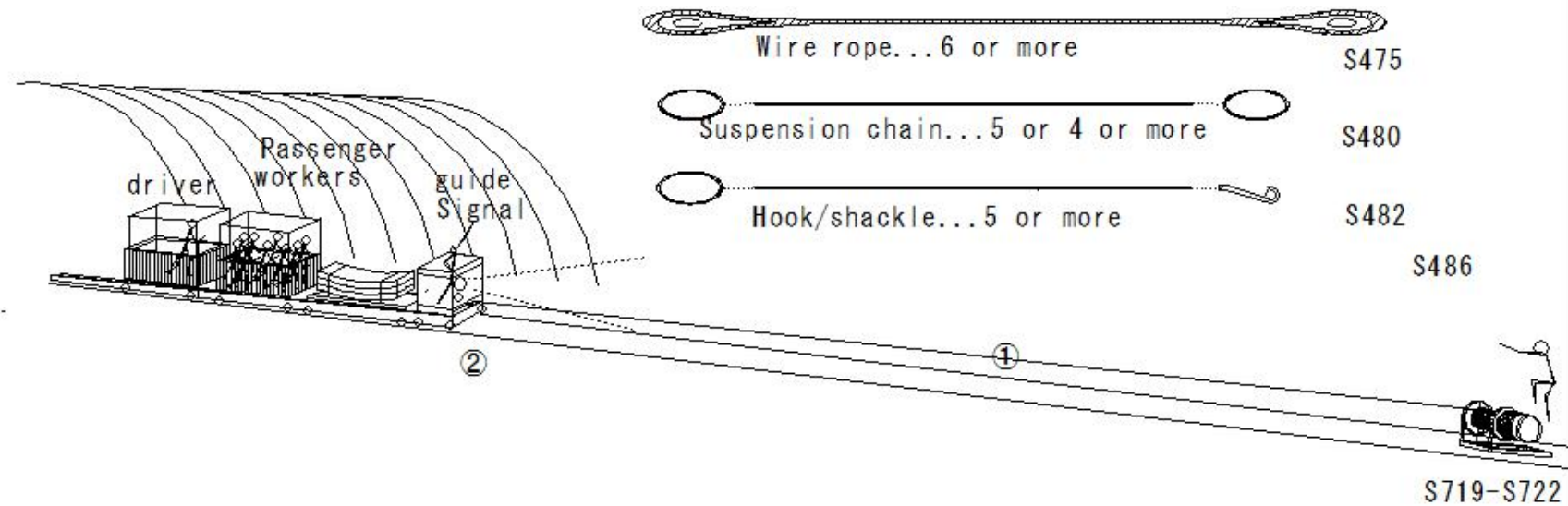
Wire rope for hoisting devices

① Safety factor 6 or more: 10 or more for hand-operated vehicles

② Secure attachment using links, etc.

①

Cross section of wire



(S741) Track equipment

(S741) Track equipment

Equipment management of vehicles, motor vehicles, etc.

Do not use unsuitable wire ropes

- ① Wires with 10% or more of the wire cut
- ② Wires with a diameter reduced by 7% or more
- ③ Kinked
- ④ Deformed or corroded



Kinked



Strand protrusion



Core mesh protrusion



Cross section of wire



Crushing



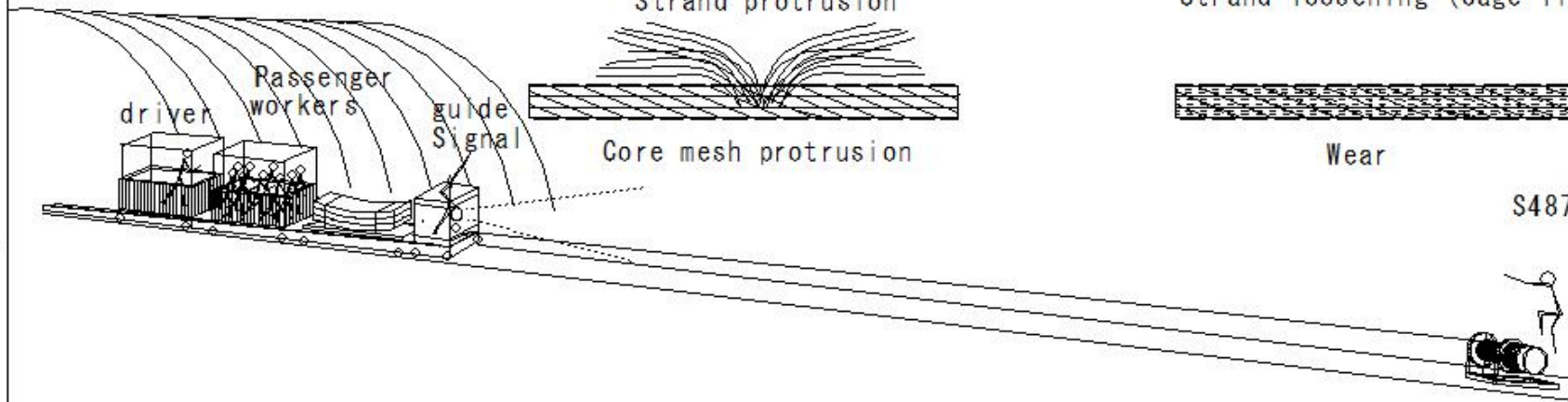
Strand loosening (cage-like)



Wear

S487

S719-S722

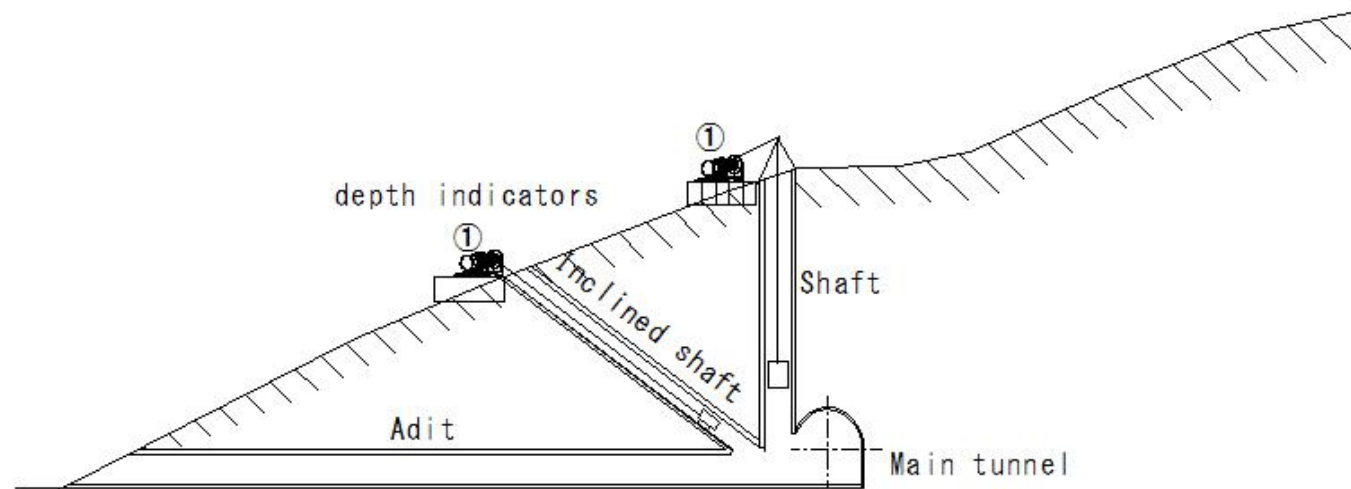


(S742) Track equipment

(S742) Track equipment

Equipment management of vehicles, motor vehicles, etc.

① Attachment of depth indicators to hand-operated hoists in inclined shafts



T222