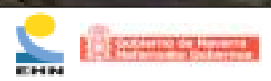




# WIND-DRIVEN GENERATORS RESCUE PROTOCOL





**CONTENTS**

**1- GENERAL VIEWS OF A WIND-DRIVEN GENERATOR.....3,4**

**2- INTRODUCTION.....5**

**3- REQUIRED GEAR**

**3.1- P.P.E. ....6**

**3.2- C.P.E. ....6**

**3.3.- SPECIFIC GEAR .....6**

**4- PERSONEL REQUIRED.....6**

**5- GENERAL SCHEME.....7**

**6- ACTUATION STEPS SCHEME.....8**

**6.1- ALERTING THE SPECIAL RESCUE TEAM.....9**

**6.2- LOCATION OF THE WIND-DRIVEN GENERATOR INVOLVED...9**

**6.3- DISCONNECTION.....9**

**6.4- RESCUERS ACCESS TO THE CASUALTY.....9**

**6.5- PARAMEDICS ACCESS TO THE CASUALTY.....10**

**6.6- VALUATION.....10**

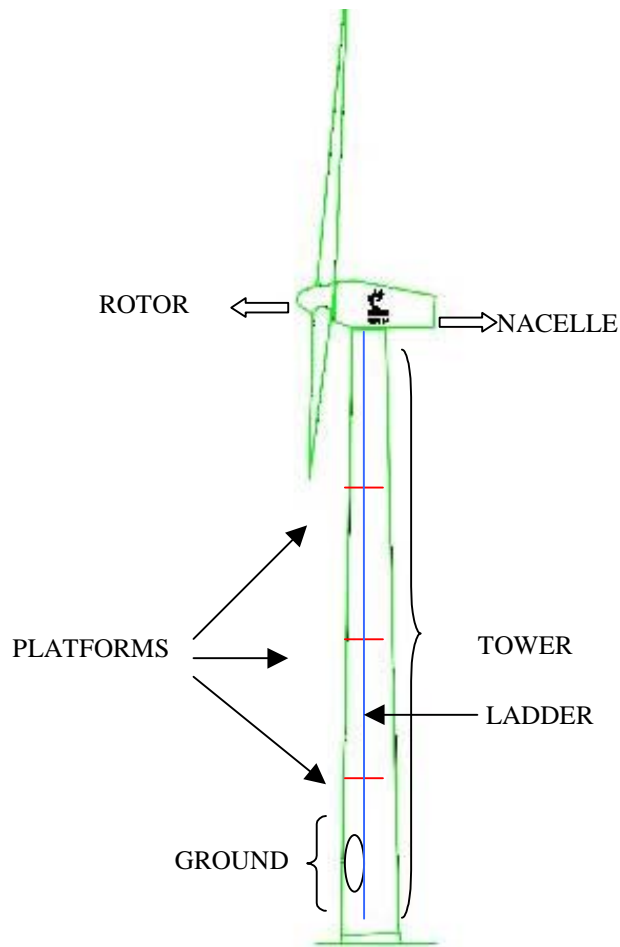
**6.7- REQUIRED GEAR ACCESS.....10**

**6.8- STABILIZATION.....10**

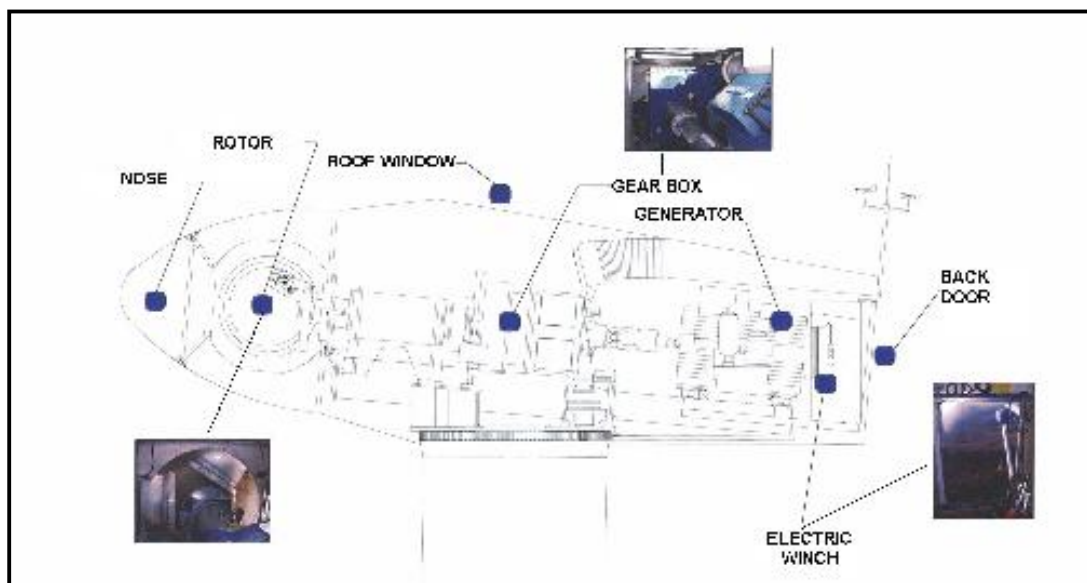
**6.9- EVACUATION.....11**

**7- 1<sup>ST</sup> STANDARD PROCEDURE/ CASUALTY HANGING FROM HIS FALL-ARRESTER.....12,13**

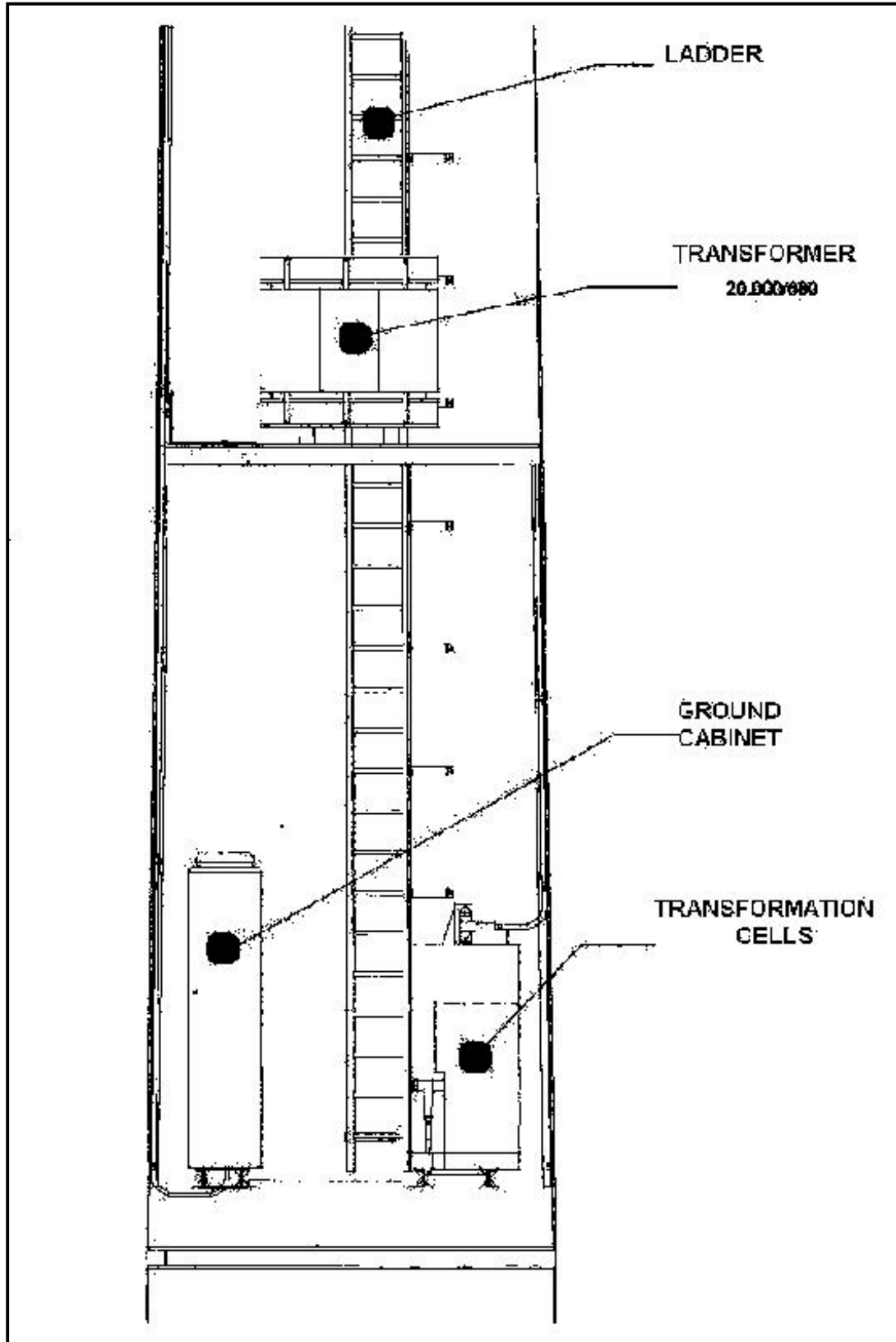
**8- 2<sup>ND</sup> STANDARD PROCEDURE/ CASUALTY EVACUATED IN A STRETCHER.....14**



**THE NACELLE**



**BASEMENT**





## **INTRODUCTION**

**IN ORDER TO BE ABLE TO CARRY OUT AN EFFICIENT RESCUE IN SUCH KIND OF STRUCTURES, THERE ARE SEVERAL FACTS THAT SHOULD BE ARRANGED BEFORE HAND.**

**IT SHOULD BE GUARANTEED THE FIRE SERVICE:**

- I. HAS DETAILED INFORMATION ABOUT THE EXACT LOCATION OF EVERY WIND-DRIVEN GENERATOR . THIS INFORMATION WILL INCLUDE THE U.T.M COODINATES, ROADS , TRACKS ETC.**
- II. HAS PREVIOUSLY DECIDED WHICH THE NEAREST PLACE FOR A HELICOPTER TO LAND IS AND ALSO LOCATED THE NEARBY WATER RESOURCES.**
- III. HAS EVERY GENERATOR KEY OR, AT LEAST, CAN GET IT FROM A PREDETERMINED LOCATION AT ANY TIME.**
- IV. HAS FALL-ARRESTERS WHICH FIT THE SECURITY SYSTEMS INSTALLED IN SUCH EXSTRUCTURES.**

**THE WIND-DRIVEN GENERATORS SHOULD.....**

- I. HAVE A SWITCH FOR THE ELECTRICITY DISCONNECTION AND BLOCKAGE OF MOVABLE PARTS.**
- II. BE NUMBERED AT THE BASEMENT AND AT THE TOP TO BE EASILY LOCATED FROM LAND AND AIR.**
- III. HAVE SOME ANCHORS PLACED IN THE NACELLE SO THAT AN EVACUATION FROM THIS POINT WOULD BE MUCH EASIER AND FASTER.**
- IV. HAVE AN OUTSIDE ACCESS TO THE NACELLE IN CASE SOMEBODY HAS TO GET INSIDE FROM A HELICOPTER.**

## **REQUIRED GEAR**

### **2.1-P.P.E.**

- Full body harness
- Helmet
- Landyard
- Ascender
- Locking carabiners
- Head torch
- Talky
- Automatic braking device
- Round slings
- gloves



### **2.2-C.P.E.**

- Confined spaces stretcher
- 2 pulleys
- 3 static ropes
- dynamic rope
- rope winch
- 8 locking carabiners
- helmet and glasses for the casualty
- short and long round slings
- anti-friction elements(edge rollers etc...)
- wire fall-arresters

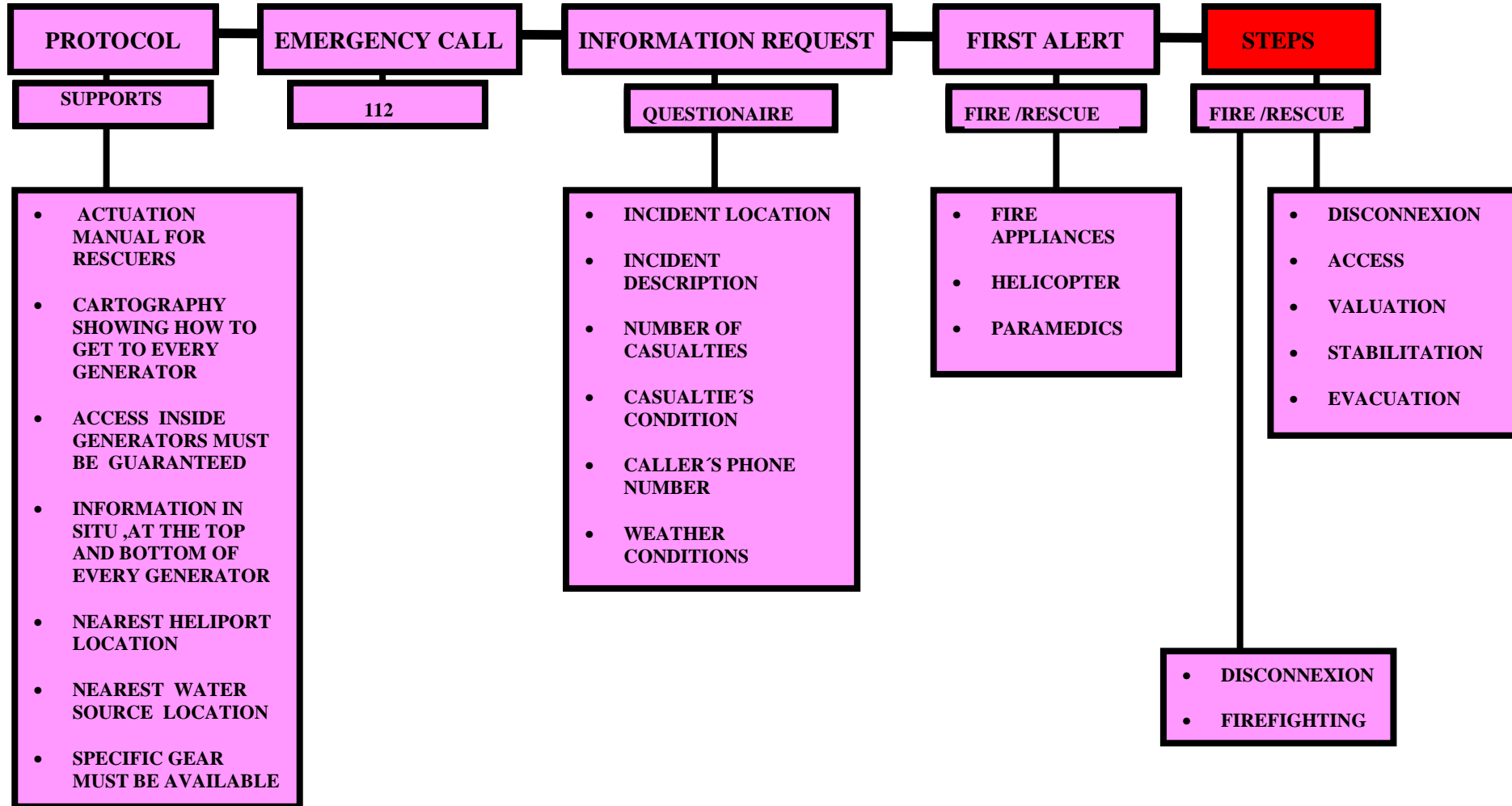
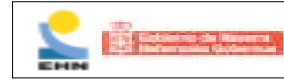


### **2.3-SPECIFIC GEAR**

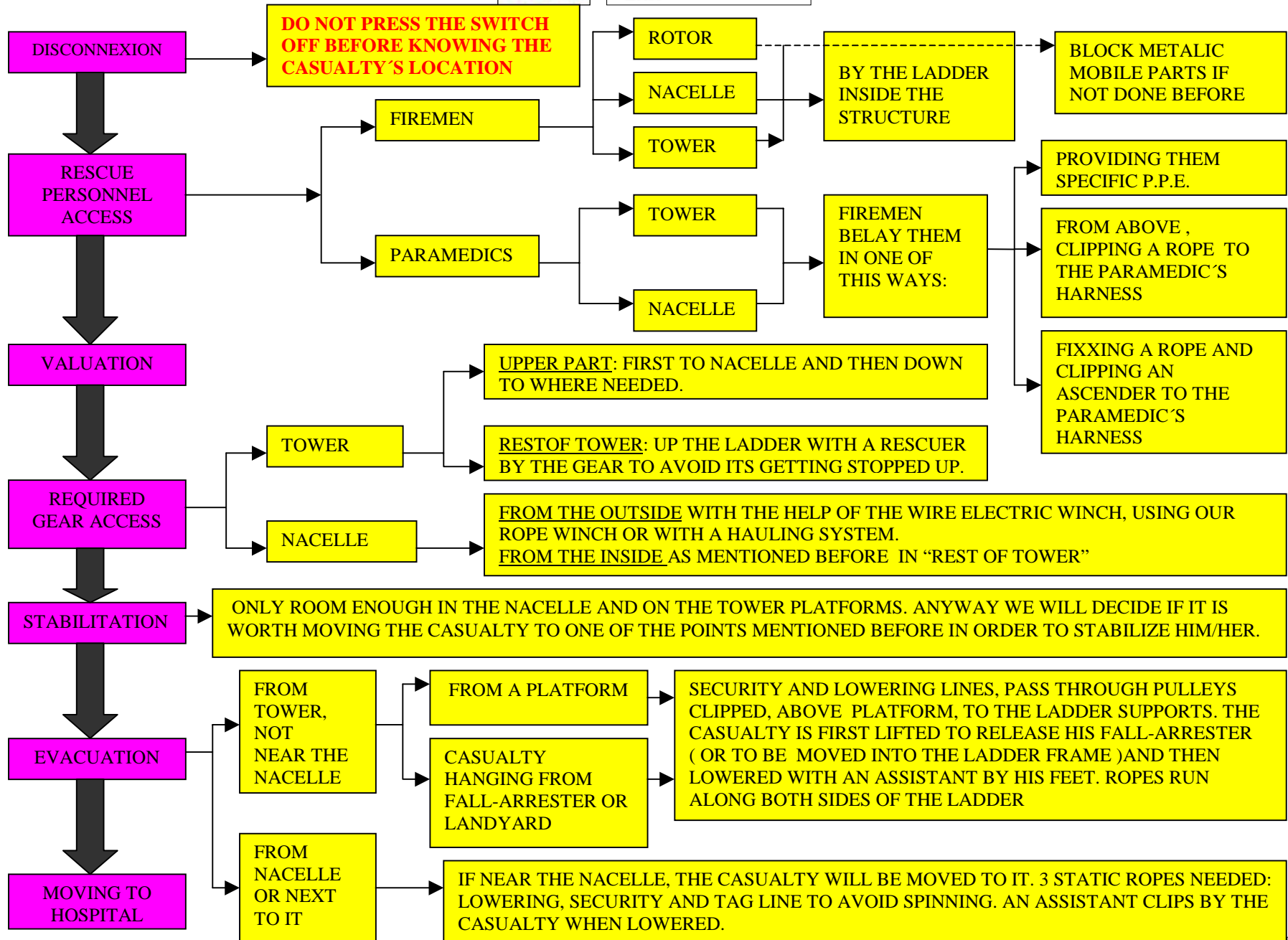
Once again, it must be emphasized the rescuers should have suitable fall-arresters. If possible, all the exstructures should have the same kind of security line running from the bottom to the top.

## **3-PERSONNEL REQUIRED**

Taking into account the most complicated evacuation (in stretcher) 4 rescuers are considered as a minimum. Two rescuers access to the casualty and the other two remain in charge of the lines when the evacuation takes place.



**WIND-DRIVEN GENERATORS RESCUE PROTOCOL**





## **5- ACTUATION STEPS**

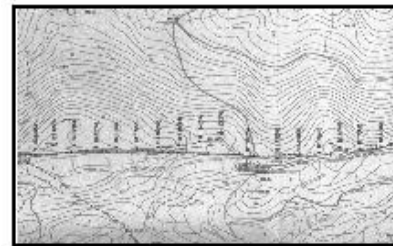
### **5.1- ALERTING THE SPECIAL RESCUE TEAM**

As soon as an incident in this kind of exstructures in reported, the special rescue group responsible will be alerted so that he decides about sending specialists to the spot. If so, they will take, at least, the suggested gear to carry out an eventual rescue.

### **5.2- LOCATION OF THE WIND-DRIVEN GENERATOR INVOLVED**

The fire Service will have some cartography with the location of every wind-driven generator, information about how to access, where the nearest place for a helicopter to land is, the nearest water resource .....

As stated before, every exstructure should be numbered at the bottom and at the top to have them located easily.



### **5.3- DISCONNECTION**



The disconnection will be made **only when it does not involve additional risk** for the casualty, specially if he is in the rotor. When disconnecting, some mechanisms move inside the rotor.

### **5.4- RESCUERS ACCESS TO THE CASUALTY**

The fastest and safest way of getting to the casualty is using an specific fall-arrester for the security line installed in the wind-driven generator, *so the fire Service should have some of them* .

Nevertheless, the safety line characteristics should be considered. If there are not fall-arresters available, the rescuers must use their P.P.E.'s . The leader will climb up the ladder being belayed with a dynamic rope from below and placing runners periodically. If more firemen are to get up, a static rope will be fixed so that they can clip an ascender (see pictures).





### **5.5- PARAMEDICS ACCESS TO THE CASUALTY**

Paramedics will ascend either belayed from above or by a static rope with the help of an ascender clipped to the harness and supervised by the firemen.

### **5.6- VALUATION**

At the beginning the firemen will value the casualty's condition and will request more qualified personnel if necessary.

### **5.7- REQUIRED GEAR ACCESS**

Two cases are considered:

- B-** If needed in or near the nacelle, the gear will be lifted from the outside with the help of the electric wire winch , a rope winch or with the help of a hauling system.
- A-** If required in the tower, far from the nacelle, it will be lifted from the inside and a rescuer will ascend by it to prevent its getting blocked.



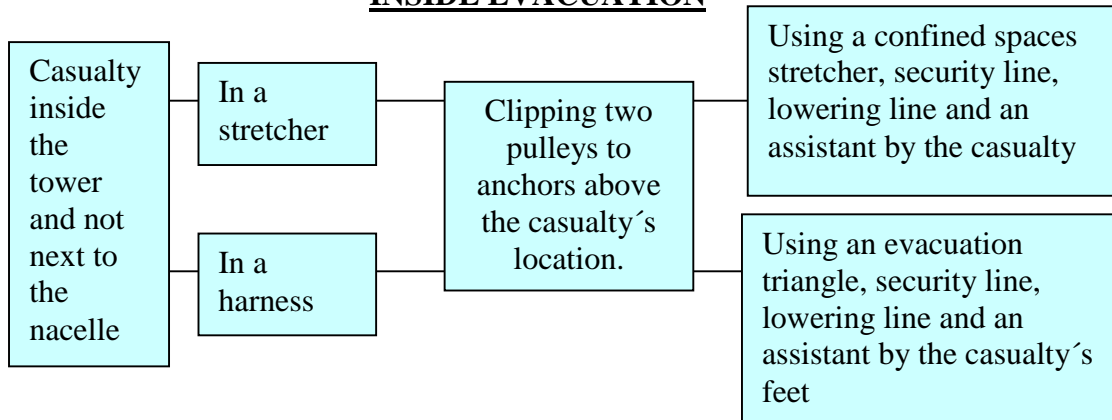
### **5.8- STABILIZATION**

Proper stabilization is only possible in the nacelle and on the platforms, in the rest of places we have to decided if it is worth since we are very likely to move him a lot.

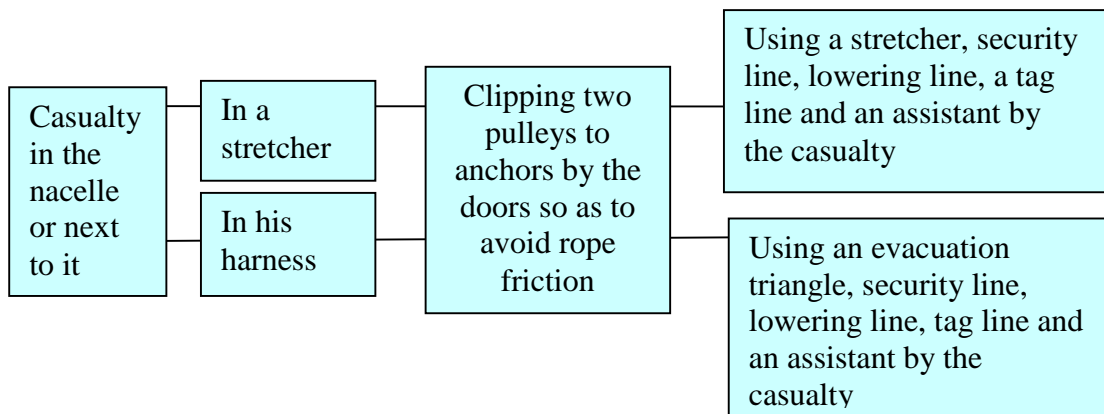


## 5.9- EVACUATION

### INSIDE EVACUATION



### OUTSIDE EVACUATION



**6- 1<sup>st</sup> standard procedure, casualty hanging from his fall-arrester.**



The first rescuer ascends self-belayed by a fall-arrester suitable for the life line installed in this exstructure. He takes with him a couple of static ropes, two pulleys, round tapes and locking carabiners.



After valuating the casualty's condition and clipping his landyard to the ladder, he continues up as far as the next ladder supports. In order to pass the casualty, the rescuer will clip his landyard to a ladder round, release his fall-arrester, place it on the wire above the casualty and then unclip his landyard.



Once the pulleys are clipped above the casualty, he passes both static ropes through them in such a way that the ropes run on both sides of the ladder.



The rescuer descends back to the casualty carrying both lines and self-belayed . Meanwhile, his team mates will clip an automatic breaking device and a rope winch at the bottom of the tower.



The rescuer clips both lines to the casualty's harness and tells his team mates to lift him just enough to be able to release his fall-arrester.



Once released from his fall-arrester, the casualty will be lowered and the rescuer will accompany him by his feet so as to move him away from any obstacle.

**8- 2<sup>ND</sup> standard procedure, inside stretcher evacuation.**



If needed, we will move the casualty to the nearest platform to place him in a stretcher. Here, in this picture, the casualty is lifted in order to get him by the ladder and begin descending him.



A rescuer will go by the stretcher foot to move it away from any obstacle. He will clip to both lines.



This is the best way to descend the stretcher, the stretcher back faces the ladder rounds, this way there are no obstacles to hit the casualty.