

Enclosure Design of Electronics Equipment
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Lecture - 35
Public utility boxes

The last lecture I tried to show you some examples of water IP numbers, what is the IP designation. A little related to this is the IX designation also. And then parallelly Lima started their own thing because this is progress all around. And finally, everything there are cross correlations and all that in the various lectures I have covered it. If you go back a little you will probably start with things like this.

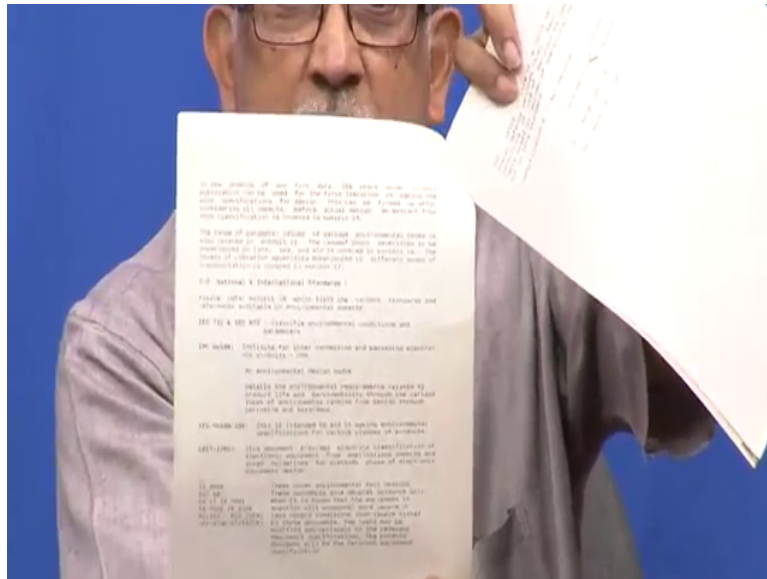
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ENVIRONMENTAL ASPECT (ELECTRONIC EQPT)		DOCUMENT/STANDARD	
		INDIAN	FOREIGN/INTERNATIONAL
1	ENVIRONMENTAL CONDITIONS CLASSIFICATION; PARAMETERS	-	IEC 921
2	ENV. DESIGN/EQPT CLASSIFI- CATIONS	-	IPC GUIDE (USA) IEC GUIDE 104
3	ENV. SPECIFICATIONS	-	IEC 870
4	EQPT CLASSIFICATIONS	CEST-115C	-
5	ENV. CONDITIONS	-	IEC 870
6	ENV. TEST METHODS	IS-9000 IS 18, IS-9001, IS 9002, IS-2104	IEC-68
	ENV. TEST METHODS	JSS-55555 (DEFENSE)	K-116 (U.K.) MIL-STD-883C(USA) DEF-STD-041ST (UK)

See this is taken from a small lecture which has given by our colleagues from a difference company. So, you notice that originally in these are all about mostly allowing things to pass in the military domain. So, we have environmental, test methods here including IS 9000.

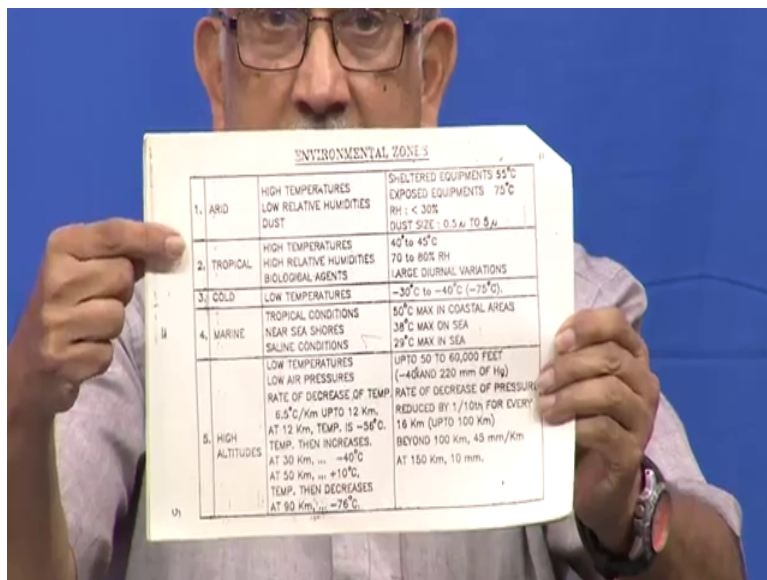
Then JS, what you call 55 sometimes closely called penta five whatever rather call it JS as 55555. So, this is joint survey specifications. And then India follows most of the sins here you seen that no; Indian thing follows all this method in issue. Then we have the other equivalents also IS a guides and soon. This particular thing is probably very very ancient.

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Now, if you go inside a little lot of data is there is in this, I will also presented some other time and one lecture exclusively I will try to concentrate on this.

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I thought somehow you need to be aware about defense on classification of what all various types of equipment: high altitude, then we have tropical, then we have cold, we have marine environments and all that. One of the things in notice here is that we need to specify the various things here saying- what are all the ambient equipment, what are all the higher and lower ambient and all this.

So, slowly these things have percolated into commercial leaves; that is non defense outsides. Now if I say the pictures if I can show me the pictures.

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This is just taken outside my house in the morning. This is supposed to be something to be mounted analyte pole, forget about whether how appropriate it is or anything. One of the things you will notice is not enough care has been taken, which I feel noise a little itself let down. In principle the enclosure is there and then you have all the necessary things including there is a bit of a gas kit.

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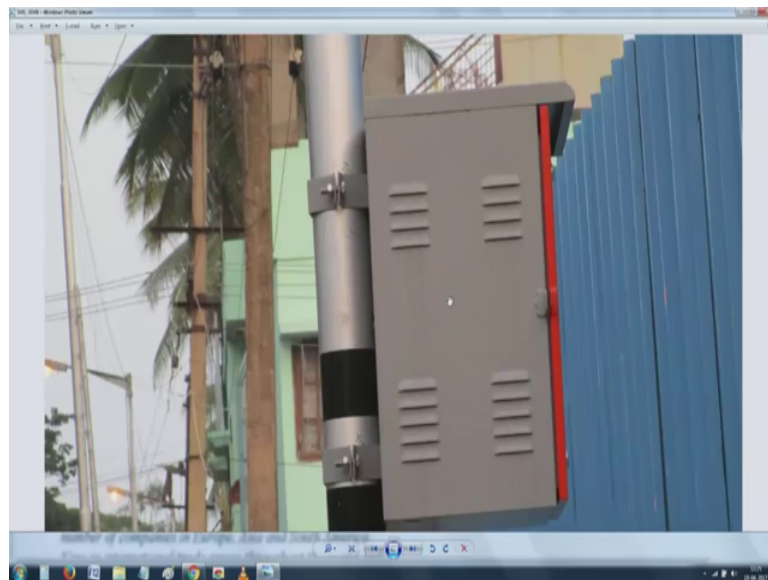
There is a bit of gas kit here, then there is a window trying to protect things, but still you see that something is wrong let me get it out of this mode, this is better.

What all you will want to describe is there; there is a beautiful lip thing on the outside. You have seen this a small lip thing is there, this lip thing will ensure that water does not collect and then a natural taper has been given in the box and then there is a what you call shilled connector also; sorry hinge. And then you have the various connectors everything all around.

Now have a look at this, this is supposed to be a surveillance camera. Have a look at in two or three will things noticed. One of the first thing is, well the camera itself is probably a very sophisticated thing. There is a proper clamping arrangement, there something here and this is the camera itself. Luckily for me I was standing in the other direction, because I am not taking anybody's permission. And then I suspected it is not working anyway.

If you go down at the base of this you see that is the top side of the camera how the camera will look and all that.

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This is the control equipment which has been mounted here. I thought I will show you side view to show the way it has clamped on to the box; I mean on to the pole how the; this enclosure is clamped on to the supporting pole. And then you see here there we have

the small louvers. You see some very beautiful arrangement about it saying- there can go inside but in principle if you remember that IP second digit 0 1 2 3 all the way up to 4: 60 degrees to the vertical in case there is a draining rain also nothing will get affected. And there is see here on the top there is a hull, second as got a projection here. A gentle generous over lap as win gain for some reasons I will get back to you. Then there is a bulldoze like edge that is given here.

So, in principle what all is required have been taken care of. There are two: built in locks then there is a beautiful window here. Typically these things all fall under the just below the IP 55 category, probably it is IP 42-43. And this is new, and then when it is new this things have all the things. Here if you see will little close that you will notice that we have this hinges which are also hidden and they way the cover has been made there is a beautiful soft elastomer packing that is given, while it is not a full flinched gas kit.

In the normal course it can ensure that dust and water did not go inside. I am quite happy about it the way this has been mounted. And there no pretences that its meant for anything. And then this is something which as probably nice and not nice at the same time. There is a beautiful IP 66 box here saying- in the unlike click as that even if it fallen in get (Refer Time: 08:23) it falls on the ground water will not leak inside and it will not be effected.

But the way it has been installed meaning: this is the cable which say I do not know whether it is a wires c type of a cable or it is a normal power carrying satellite cable that comes to my house. You see here the only strain relief given is the inlet cable and the output cable have been taped together. It works in places where rain accorded places like where we live there is no problem at this light has hint the there is an operator on hand any time of the day he will come and do it. But in the long run it leads to a problem. There is a tremendous strain on this cables, logically the should have been a separate ganti wire are a support wire which will ensured that this will not take the load.

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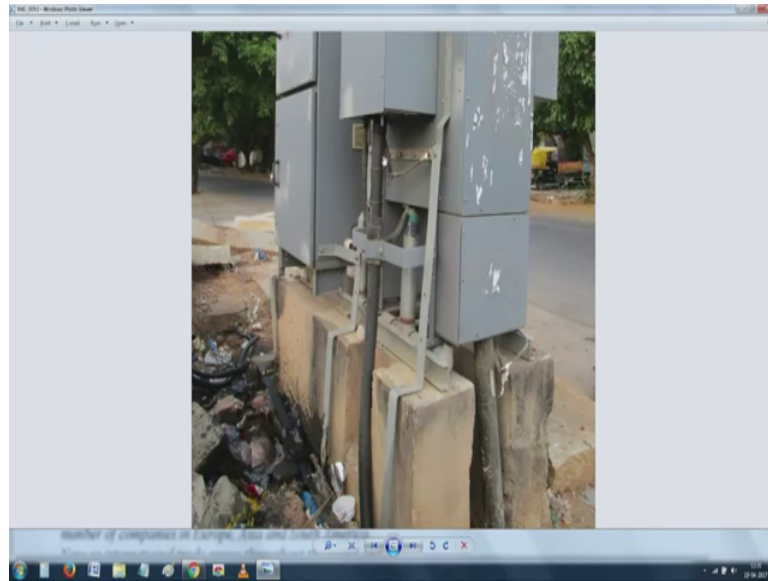


No, I will take you to a very scary installation. This is one that brings part two hard locality. And the magic is it is a remote switch which can switch 119 33 kilo vault feeders from here. So, somebody just need to open and then I do not actually there are the feeder is stagnated here and there relays insider anything. My interest here is only to show you the enclosure design. And then somehow I am against its vandalizing, but it has been vandalized.

If we see very carefully everything is neatly sealed inside including of a no visible plumbing. This is a normal commercial plumbing nothing very electrical about it. So, let me take a close at look at the back of the equipment, can you see? This set is also not a fully sealed equipment are anything, they still a small air inlet here accept being probably looking by the size at looks like a little more than 120 mm properly it is a 160 mm cover, it does not air filter inside. And then at the back there may or may not be a fan. And then everything is raised from the ground. You see from the ground it raised quite high from the ground.

If we take from took the here probably it is of the order of 60 centimeters. So, in all our known conditions flooding will not occur. You seen that in while mounting this itself enough care has been taken to ensure that it is unlikely get flooded. Anyway ignore what is there here. On the right side lot of garbage ignore that.

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See these are all; this is the actual 11 kilo vault underground power cable which comes here. And inside the high current, fortunately at 11 kilo vault and other feeder system we have plus it also sends us where there is a ring main are double feeder. In case they try to isolate still if a potential is present it will give a warning to the next adjacent thing so that sections of it can be isolated by the operation of one switch.

My interest here is to show you several things including a beautiful earthing here. Seen that, only my little how do you say cynical comment is I hope the paint has been applied after their thing has been done or the paint has been scraped before their thing lugs have been done. You see here there is a beautiful earthing wire, then we have this braid, and this is terminated on the copper thing which comes with the box and the whole thing is taken down.

Parts of it they have dry to form the what you call follow the lot to the letter meaning: we have various devices here everything is you know neatly mounted, but also know I am one of those (Refer Time: 13:26) fellows. See where I am pointing out that is a gland nut. I hope it is in the seal condition meaning: there is a dummy packing to make sure that no water can go inside.

So, this is typically are problem or what you call the situation outside. Not quite so comfortable, you seen this you know. This is where any on amount of making nomes are standards is very different enforcing and people trying to use what you call training in

maintaining this equipment. So, we have here this looks like a commercial plumbing, including this an elbow here which ends up here with 1 inch its start at the one and half inch and ends up here. And even for tease and all that let see here something has been installed here.

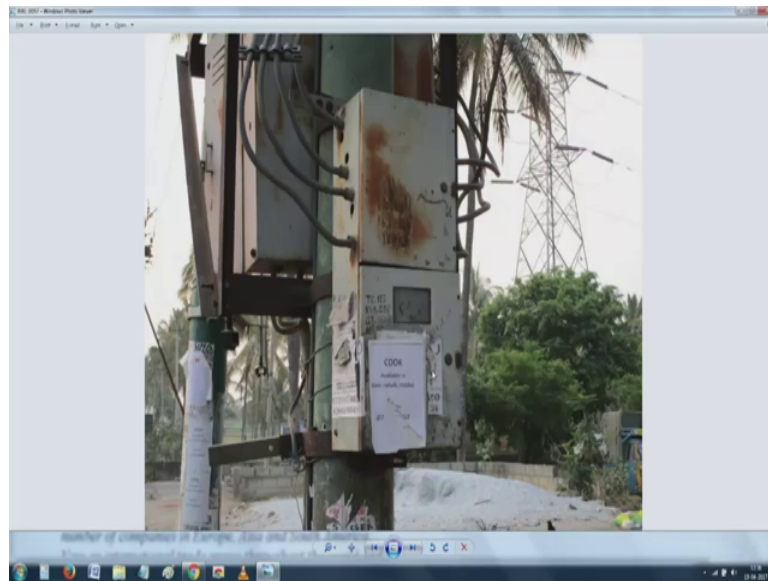
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I live here, I am not trying to brag and all that I live in a house, but I keep telling my friends I live on to the tree. And then you see all these cables running across. By the other side of the road has a sophisticate a equipment. You see the protection are lack of it which we have. First thing is it came where proper isolators and switchers. And in due course all of them have failed, so they have isolated. These three are coming from the distribution transformer. Secondary, we have a 400 volt system instantly not for 40.

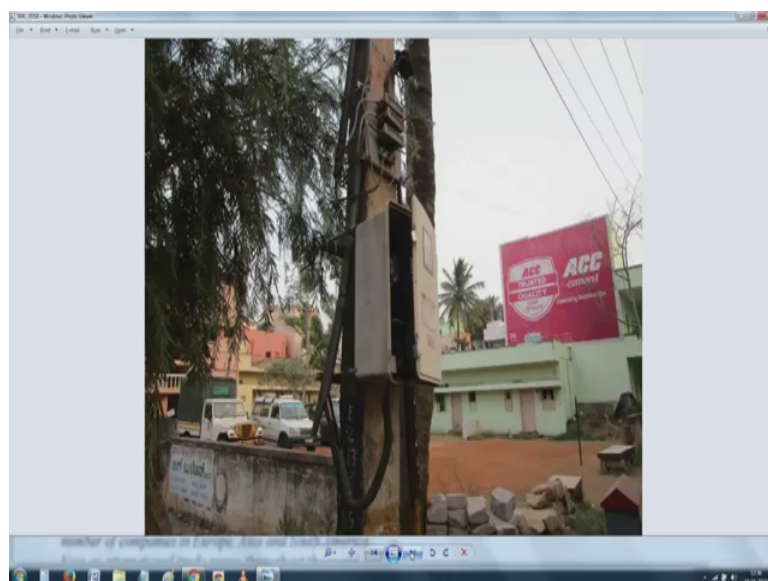
These 400 volt line to line 400 volt systems are isolated here. And then this thin wire is not even a fuse wire, it is just one of those aluminum conductors by trial and error which they would like to call practice they use it partly has a fuse. My problem is it is exposed there is not too much of gap between one thing and there. Actually it just in just about in of gap is there, so does not touch with each other. You seen this on top of it may have the distribution transformer.

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Looking at the other side these a little closer look. There is a very good persistence cook, but then I do not why it is. This is a 250 KVA transformer. And then you see here we have all this gland nuts some are occupied some are not occupied and this is a energy meter we sits at the bottom of it. I do not know the status of it, but what probably started as an IP 55 box eventually it is as good as a IP 20; I mean rather 10 box. Because is the chance of water trickling into this, if let us say water comes up to here it trickling into it. And then it will lead to all sets of problems.

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I have gone across and try to look at inside one of this. This is a street light controller suppose to have a timer inside and then street lights are. At one end we talk about sensing the ambient light and then switching on the street lights, also with a timer device, also probably remotely done, also probably remembers fore settings for the seasons.

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But then actually if you opened the box and see inside you would have guesses it; what you found at this. I think you should enjoy it, I will just point out something. And this is supposed to be a timer the like which some places you will find at swimming pools for the homes and all. And this is the ultimate beauty. This timer is suppose to switch on this contactor, it is a 3 pole plus neutral 3 pole lack contractor. I cannot understand; what are all these things what my interest is here see the big opening there; what happens to this we have no clue what it is.

And then as you go down here is a suppose one of the safety fuses. See how well, how safely the safety fuse has been taken care of. And we have something here you have seen, but then we have all that it tells necessary we have a gas kit here and it is not a hard gas kit it is a tubular elastomer gas kit. The advantage of tubular elastomer is: it behaves in a slightly different way and such places where we have more gap and we have a small lip here. This lip goes or the other lip the remaining packing and this takes care of it. And then you see here extreme care has been taken and how will the hinge is taken care of, and the whole thing is a polyester mold

And then even if you look at the window we have this. But then coming back to this small switch here you have seen the other side of it: this is how lights or switched on after the first failure. They have given as a bypass switch, so that you switch on the bypass switch the contactor comes into place and switch is on.

Right now I do not know is the contactor itself as in the circuit or not.

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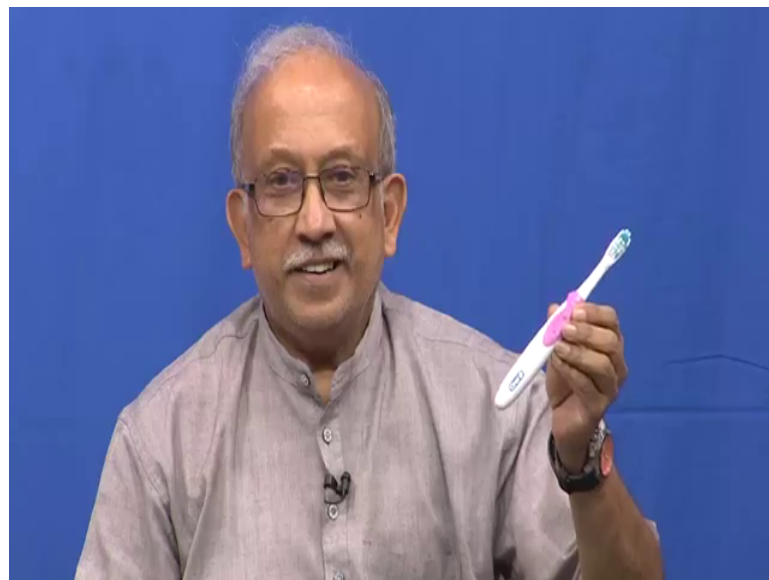
In the base of most of our street lights this is required to be one of thus genuinely IP 55 cases by which we have a flexible conduit pipe, the feed is suppose to come through this, then we have all the connections. But the way it has been done this actually this is a second level after they found out the one mounted directly at the ground level there is a problem, they isolated all this and then that attach this here. I am sure there is a benefactor which is making sure no that will live a long life. And this is a security camera the way installed on top hoping that fellows like us you know want take pictures and spread it all over the internet.

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Before I get back to the main lecture I want to show you few of the exhibits here. While that was all related to outdoor promotional equipment please have a look at something you are likely to find at home.

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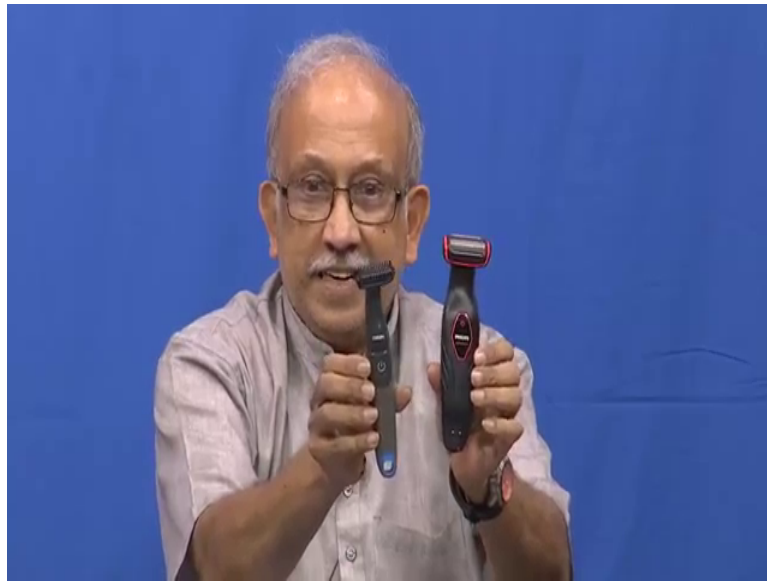


It makes a nice sound, oh I do not know how it works probably. No, I will not put in the mouth, do not get scared. This a routine electric tooth brush; all the elements which have been shown in this industrial equipments are also applicable here. Added to that, it is a personal hand used device which also needs that you need replace this heads- oh I do not

know how to replace the head I expect that you press something and the heads come out. And the whole thing is sealed, even if you keep it in a tumbler with water or saline solution or some other dental thing and even if it accidentally falls in bucket of water nothing should happens to this.

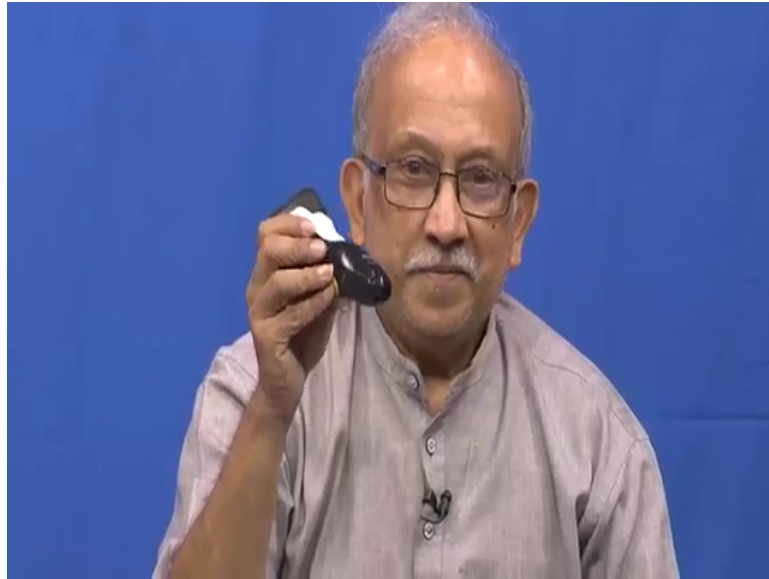
The same elements what you find in that IP 65 or IP 56 also hold good for commercial equipment like this I am sorry handled equipment like this.

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I will now take you to too more interesting things. Kindly ignore the thing, I am not the trade mark but I expect that this is a good example to shown. Unlike those things to show I see that these are very much popular everywhere. This one is a slight variant on this old round electric shaver, even these have been made such that the equipment does not get spoiled laser does the operator get heard in the unlikely cares of its getting in contact with water. Should accidentally fall in water which as need it shake it off. And then you say all the elements of aesthetic and argon make have been added to this.

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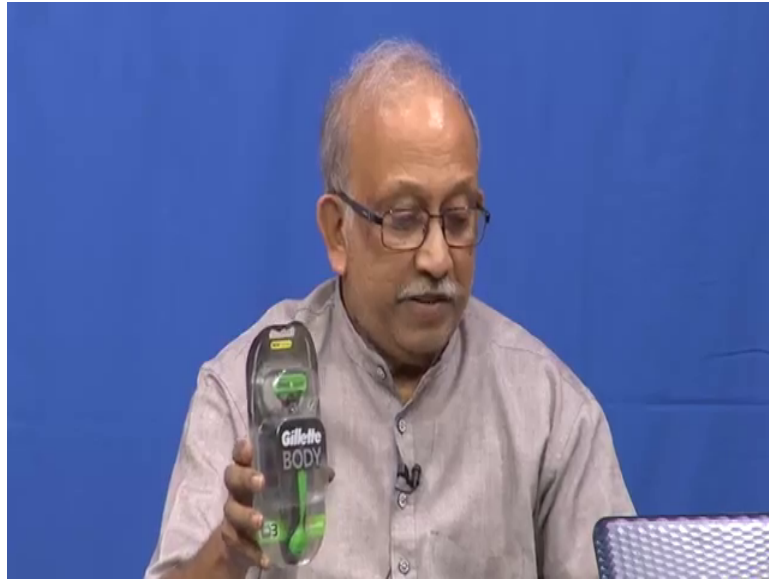
One more which I am sure you will appreciate more in this case you see to small contacts are there, the resets in side and it goes on to a dock. In this case instead of a dot if you remember earlier I was talking to whenever you want to drop our the other side you have a socket source up our the load side so you have two pins

So, you have to opens here, but still it requires a wire to be connected. And generally when the wire is connected you cannot use it, like you cannot put the wire and use it like this. Still there may be a few people new try to beat the system. As usual know what all is there are all included in this.

They have gone one step further in this design see what they have done you do not have that resets two pins to take per, instead what we have here is two external flush mounted contacts; I will not call them a pin. Now it is a dock and then the dock is heavy thing which has the base I intentionally left the dock it is here somewhere I left the dock. The idea is you cannot hold the dock and take it out. As long as its parched there in the dock automatically, it is a stowage actually; automatically the contact is made. This is far better sealed then the other one I have shown you.

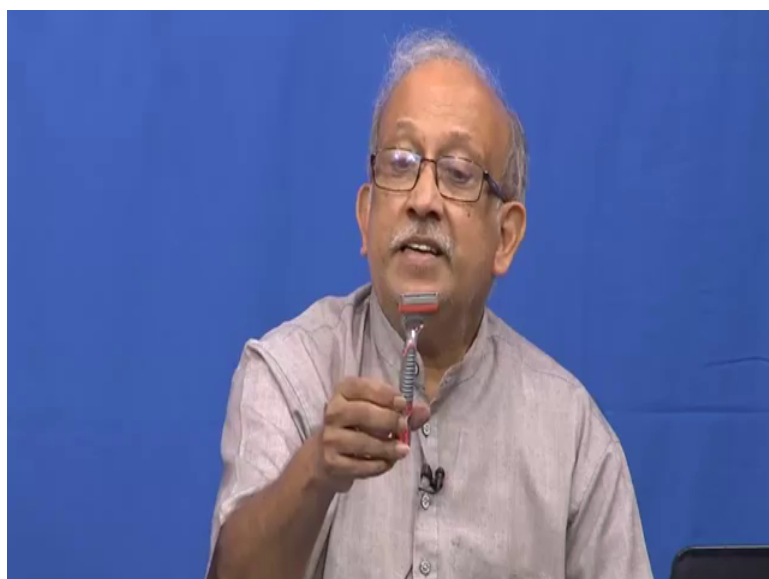
Advantage of these being they use the same sort of principles that have gone into the other gas cutting practice and all.

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Now, as I go closer and closer, I will try to show you two of your body one things. I am sure all of your familiar probably with this shaver. I mean I do not know where I should call it a razor or anything, basically it is a shaver. It is beanie, absolutely there is nothing issue about it expect that it claims they have too many number of what you say blades and so on. I do not know how many blades, somebody has extra polluted it saying in the year 2020 you will have so many now may be 20 blade and all. It is just a joked, the issue is where interested in the basic function and then they are ergonomic and how to put it an all that.

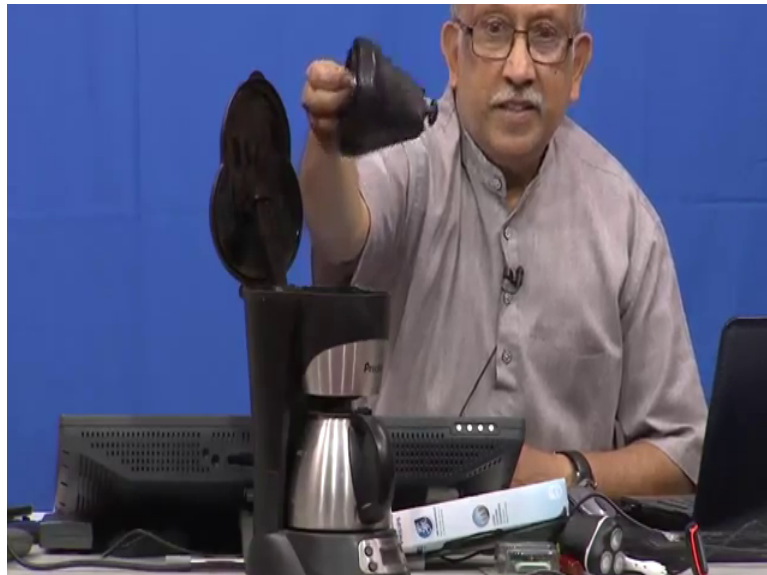
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Eventually these also have gone electronic. I buy it because I enjoy these things. You have seen this know, this a beautiful shaver which has a small vibrator inside. While they are powered in one way this is slightly different. And in fact, by definition we are suppose to use it with shaving form which is wet and it may have conductivity which is quite higher than normal water.

So, even this has been very carefully designed to make sure it does not go in hurt itself or hurt the user. Now I will try to show you one what you call the crip of electronics into these things.

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Seen we have a coffee maker, part of it is known well known. At the top we have the usual you know water filter and then all the stuff is there. And then it has a spout and we can collect the water. But the interesting part is at the base it is loaded with electronics and connected to the mains all the time. It will forget its time if a remote from the mains the built in clock will lose its time. So, you cannot say disconnect while using.

So, every known practice we de like to have goes into the use of this equipment. So, what we thought was only probably professional and meant for industry are control applications, does not stay like that anymore. All these professional practices have slowly being adopted by our normal equipment which you use at home. Typically appliances you use at home.