

Flusarc 36

End of Life Instructions

**Gas-insulated switchgear
for Secondary Distribution up to 36kV**



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Introduction

The end of service life phase is considered a very important part of the life cycle of Schneider Electric products. The environmental impact inherent in the disposal of equipment is sometimes more polluting than that of the manufacturing, distribution or use. European directives, such as WEEE¹, ELV² et RoHS³, have confirmed this point and all insist upon the recovery of waste products and their valorisation at the end of the equipment's service life.

Even though our switchgear is not covered by this legislation, Schneider Electric is willingly attempting to optimise recycling, the processing of waste and, as a consequence, the end of service life phase of our products.

This guide is aimed at facilitating the disposal of Schneider Electric products whilst minimising their impact on the environment.

The separation of the component elements making up the switchgear is completed:

- Either, by disconnecting the mechanical linkages, 
- Or, by dismantling, that is to say by breaking or shearing these connections. 

¹ DIRECTIVE 2002/96/EC of the European Parliament and the Council of 27 January 2003 on Waste Electrical and Electronic Equipment

² DIRECTIVE 2000/53/EC of the European Parliament and the Council of 18 September 2000 on end-of-life vehicles

³ DIRECTIVE 2002/95/EC of the European Parliament and the Council of 27 January 2003 on Restriction of Hazardous Substances

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Presentation

These End of Life Instructions are applicable across the full range of SF₆ gas-insulated Flusarc 36 kV products. The switchboard taken as an example is the C-C-T1 version. Its composition is representative of its category.



Characteristics of the range

Name:	Flusarc 36
Switchboard:	Modular
Switchgear:	Insulated by SF ₆ gas.

Start of Manufacture	End of Manufacture	Installation Guide
2005	Not defined	SDIOPM001-02

Characteristics of the Units

Type	Average Weight (kg)	Weight of SF ₆ (kg)
C	200	2.3
T1	270	2.5
R	120	2.3
CB	200	2.6
M	150	N.A.
C-C-C	385	5.3
C-C-C-C	520	6.3
C-Re	300	4.0
T1-C	310	4.0
T1-R	280	4.0
T1-C-C	440	4.2
T1-C-R	410	4.2
T1-C-C-C	570	5.0
T1-C-C-C-C	700	7.5
T1-T1-C-C	620	7.1
T1-T1-C-C-C	750	7.5
CB-C	310	4.0
CB-R	280	4.0
CB-C-C	440	5.3
CB-C-R	410	5.3
CB-C-C-C	570	6.4
CB-CB-C-C	620	7.0
CB-CB-C	490	5.3
CB-CB-CB	540	7.8

Ecological declarations

Flusarc 36 switchboard	April 2011	8 pages
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Service life

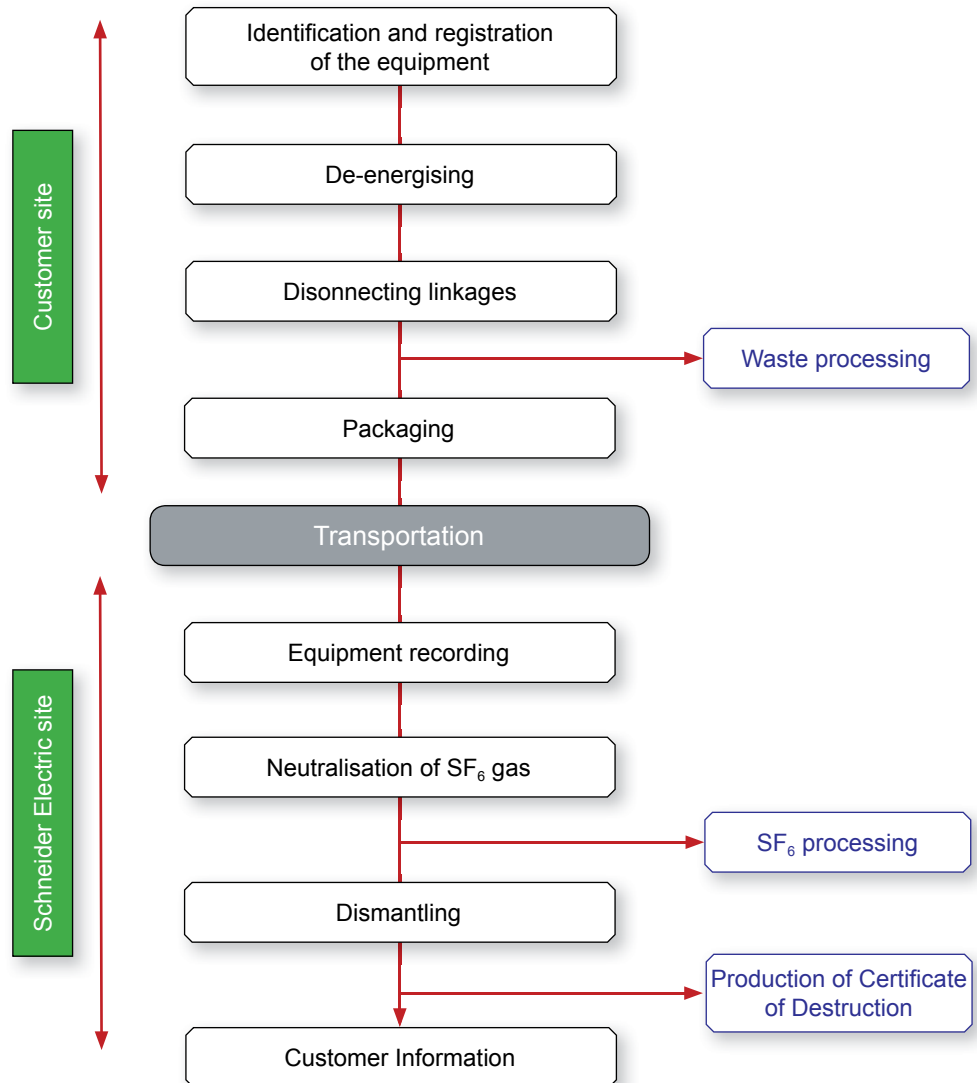
The service life of a Flusarc 36 switchboard is estimated to be 30 years. This may vary with the environmental conditions, the operation and maintenance of the switchgear.

Identification and registration of equipment

The Flusarc 36 range has several functions, assembled into switchboards. The layout and equipment installed in the latter may vary. The information on the Technical Data plate is indispensable in identifying the switchboard concerned and determining its composition.

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Example of the complete life cycle and end-of-service life processing



General Safety Instructions

- Wear the personal safety and protection equipment required for each operation (gloves, goggles, safety hat and shoes, etc.)
- Before any dismantling operation:
 - De-energise and earth the Flusarc 36 switchgear (follow the process given in the section describing how to de-energise a switchboard).
 - De-energise all Low Voltage interlocking systems.
 - Release the springs on the mechanical control mechanisms.
- To neutralise the SF₆ gas, which, regardless of specific indications, must be considered to be highly polluted:
 - Transport the materials as category ADR⁴
 - Carry out all SF₆ gas recovery work within a dedicated space.
 - Within the same space, clean and wash down all parts before valorising.

⁴ ADR - French regulations for hazardous substances transport by road (applied to hazardous waste)

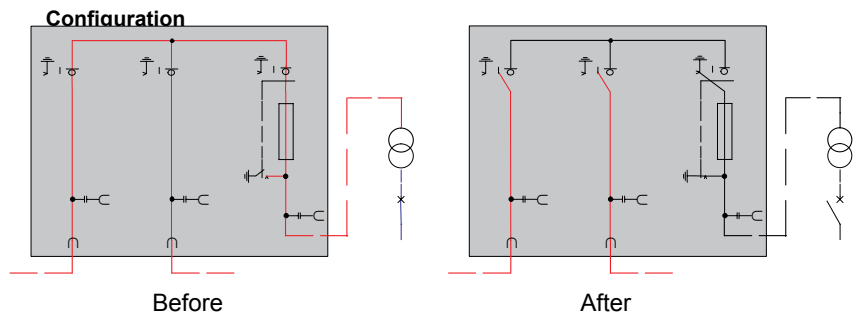
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De-energising a switchboard

Shutting down the energy consumption units

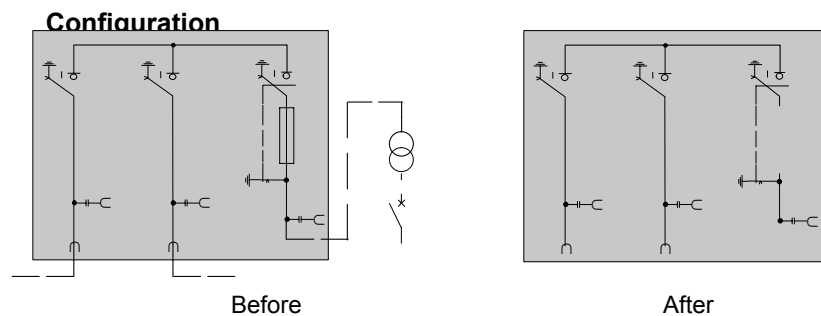
Medium Voltage locking-out operations by the User and Distributor

The de-energising of a switchboard absolutely must be followed by an electrical lock-out of the unit. This procedure, carried out by the customer's manager responsible for lock-outs, is broken down into five stages (Lockout – Tag Out⁵).



Disconnecting linkages

Operations	Estimation	Operators
Remove the fuse access cover	3 hours	2
Remove the HV fuses		
Remove the cable access panel		
Remove cable clamps then un-plug the HVA cables		
Disconnect any LV connections		
Disconnect the general ground electrode connector		
Remove the floor mounting points		



Recycling

- Send the HV fuses in recycling via Household Waste channels
- Send the following ferrous metals for recycling:
 - Operating handles
 - Cable compartment access panels
 - Cable clamps and blanking panels
 - Fuse protection cover

⁵ Schneider Electric Instruction T&D EHS OI - 3 - Electrical Risk Prevention LOTO

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Conditioning & Packaging

- The switchboard is always filled with SF₆ gas



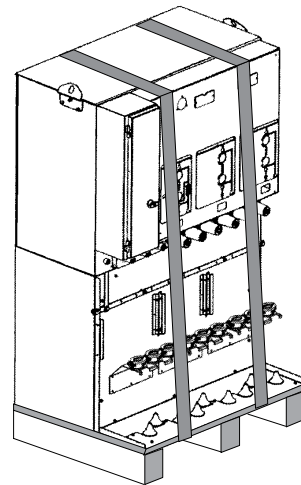
- Do not pierce the tank.
- Respect the centre-of-gravity markings when handling the equipment.

- Attach the Flusarc 36 Unit to a transport pallet
- Identify the switchboard
- Protect the switchboard from a physical shocks likely to cause an SF₆ gas leak

Transport

- Respect the restrictions laid down for ADR⁶ transportation (Preparation of a Hazardous Waste Monitoring Form) and declaration for the authorities (Prefecture in France) if necessary.
-

Configuration



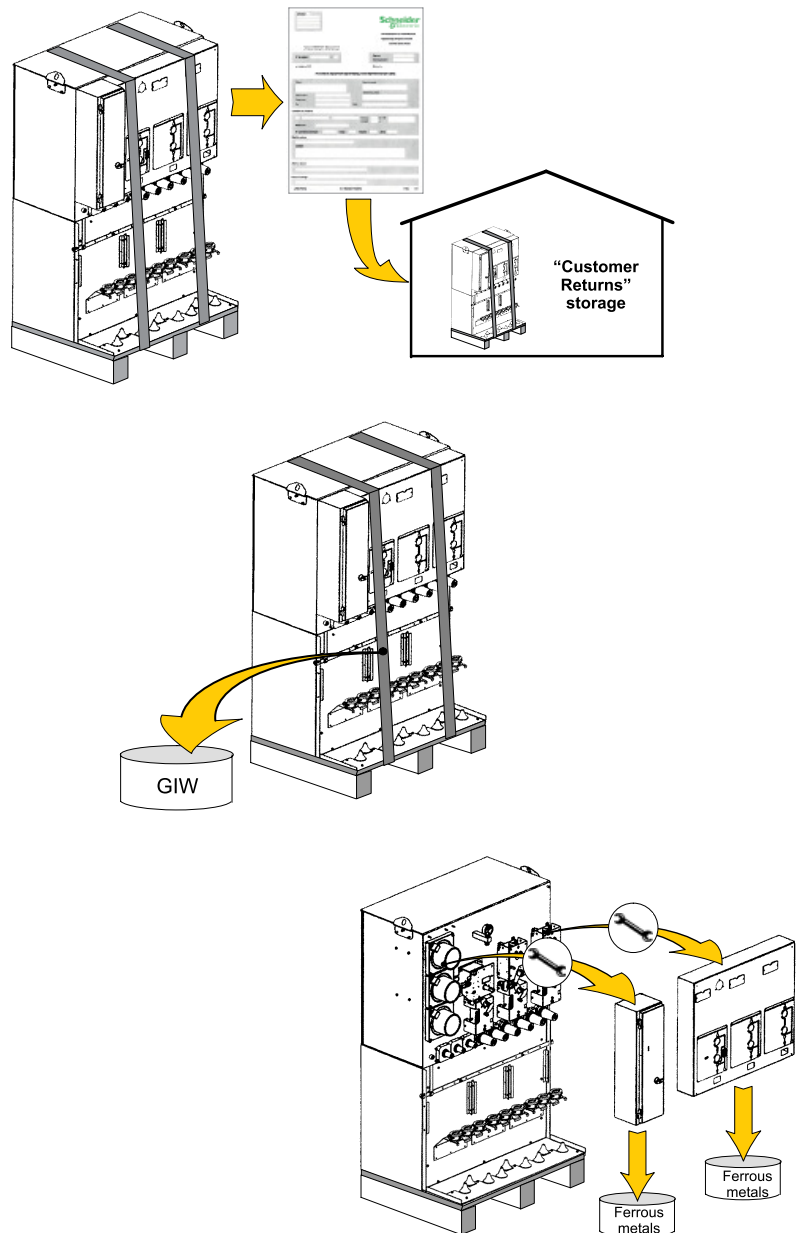
⁶ ADR - French regulations for hazardous substances transport by road (applied to hazardous waste)

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Registration by Schneider Electric

Operations	Estimation	Operators
Unpack switchboard, but keep it attached to the wooden pallet to facilitate further handling operations.	0 h 30	1
Identify and register the equipment by opening an 'Equipment Return' form.		
Possible storage of the equipment		

Configuration



Recycling

- Remove:
 - Plastics via the recycling of GIW (General Industrial Waste) channels
 - Metallic covers, via the ferrous metal disposal channels

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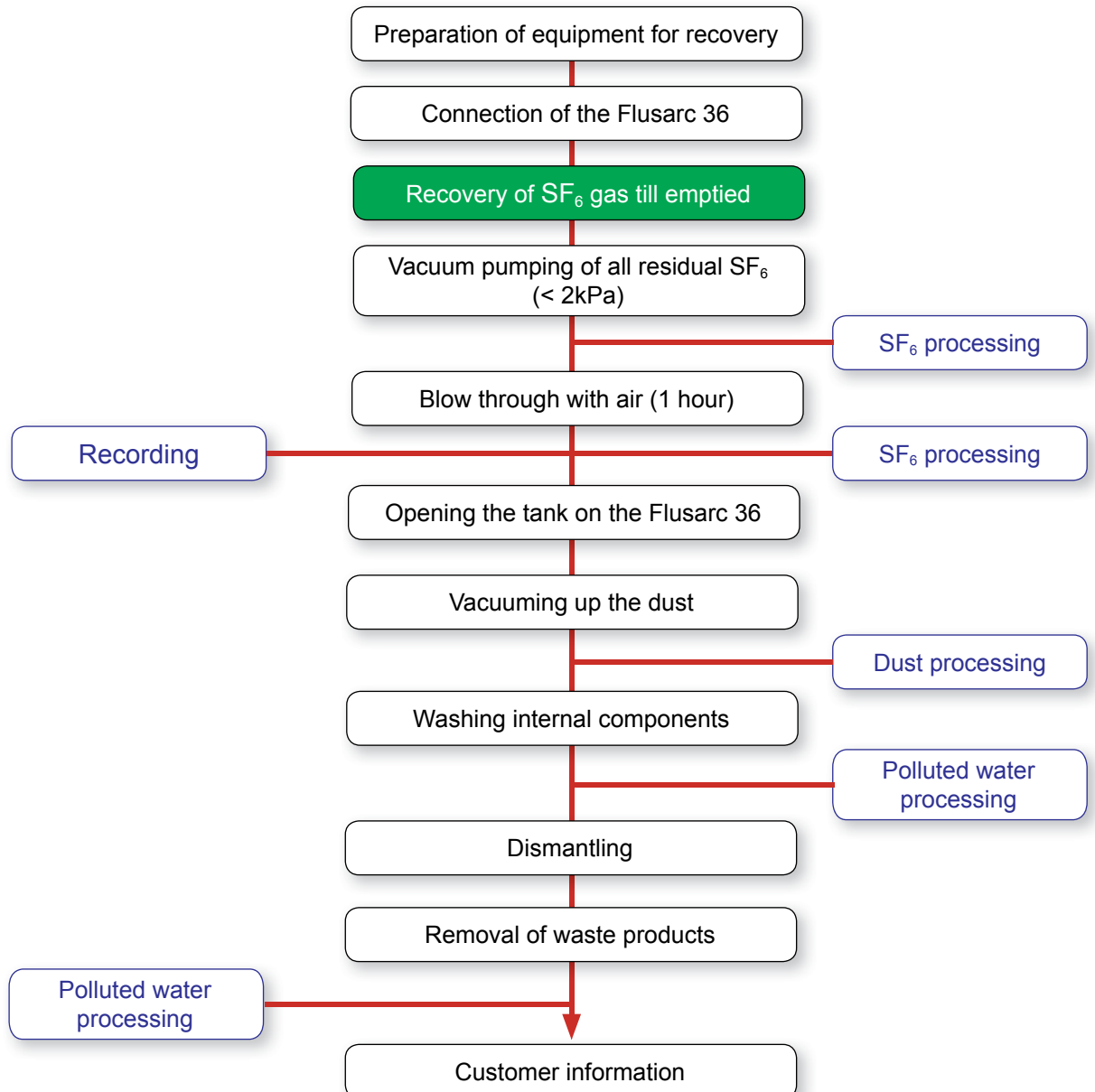
Neutralising the SF₆ gas

General instructions for the recovery of the SF₆ gas⁷

- SF₆ gas recovery operations must be carried out within a dedicated room.
- The operators must be:
 - Trained to perform this work,
 - Wearing the required items of Individual Protective Equipment,
 - Aware of the risks inherent in the chemicals produced by the decomposition of sulphur hexafluoride, as well as the measures to be taken in the event of an accident.

⁷ « SF₆ Handling Guide » Schneider Electric

Successive stages of SF₆ gas recovery



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End-of-service decommissioning room

The SF₆ recovery operations and the disassembly of polluted equipment must be carried out within a suitably designed room.

This room must be fitted out with:

- A forced air, filtered extraction system.
- A containment basin to recover any polluted liquids,
- A heating system protected from any projections of liquid.

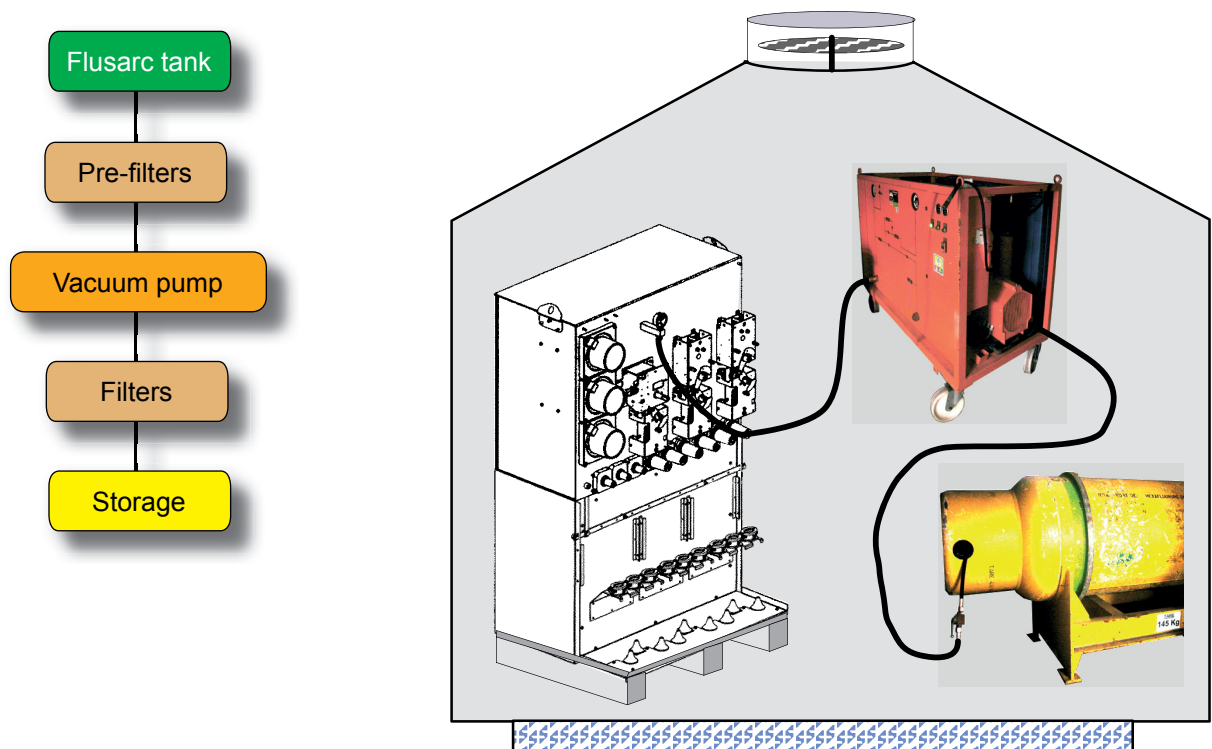
The room must also be furnished with equipment to:

- Recover the SF₆ gas:
 - Vacuum pump (Dilo unit, for example) with a connection for a valve and a second connection for a press-fit nozzle.
 - A specially designed, yellow container for used SF₆.
- Clean parts:
 - A vacuum cleaner with a dust recovery tank and filter bag.
 - A pressure washer with a neutralisation solution.

SF₆ gas recovery

Operations	Estimation	Operators
Connect the suction hose to the valve	2 h 00	2
Lower the rated pressure to atmospheric levels		
Continue recovery to eliminate residual pressure		
Let the air back in slowly then let the device stabilise for 1 hour		

Principle

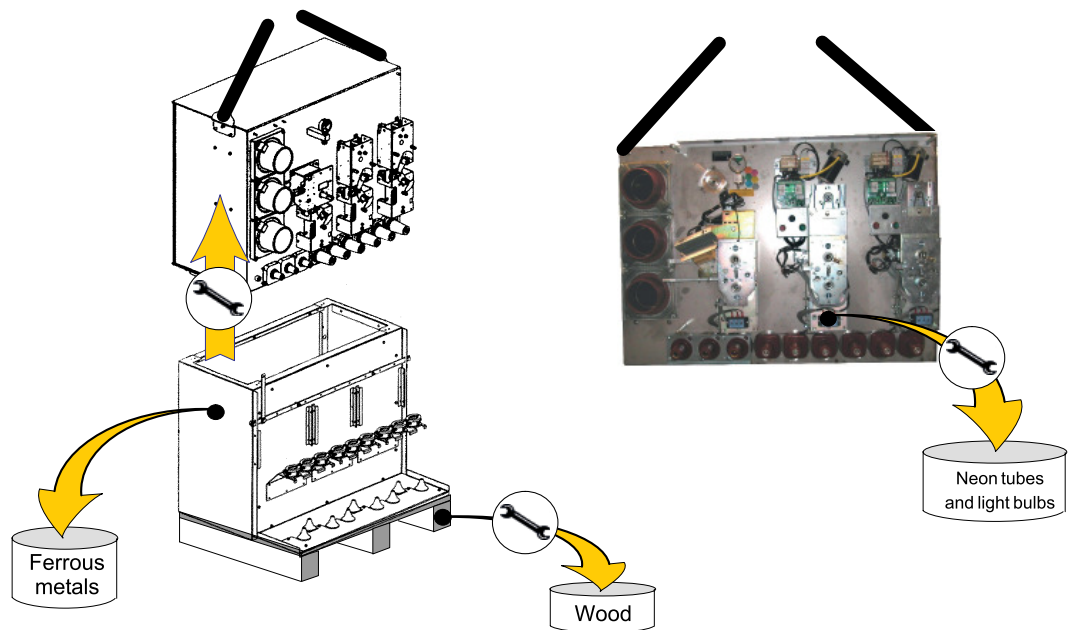


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Separation of the tank from the basement

Operations	Estimation	Operators
Remove the mounting screws attaching the tank to the casing	3 h 00	2
Using a lifting equipment (capacity: 500 kg), lift the tank through the four lifting rings		
Remove the wooden pallet		
Remove the mechanical controls		

Principle



Recycling

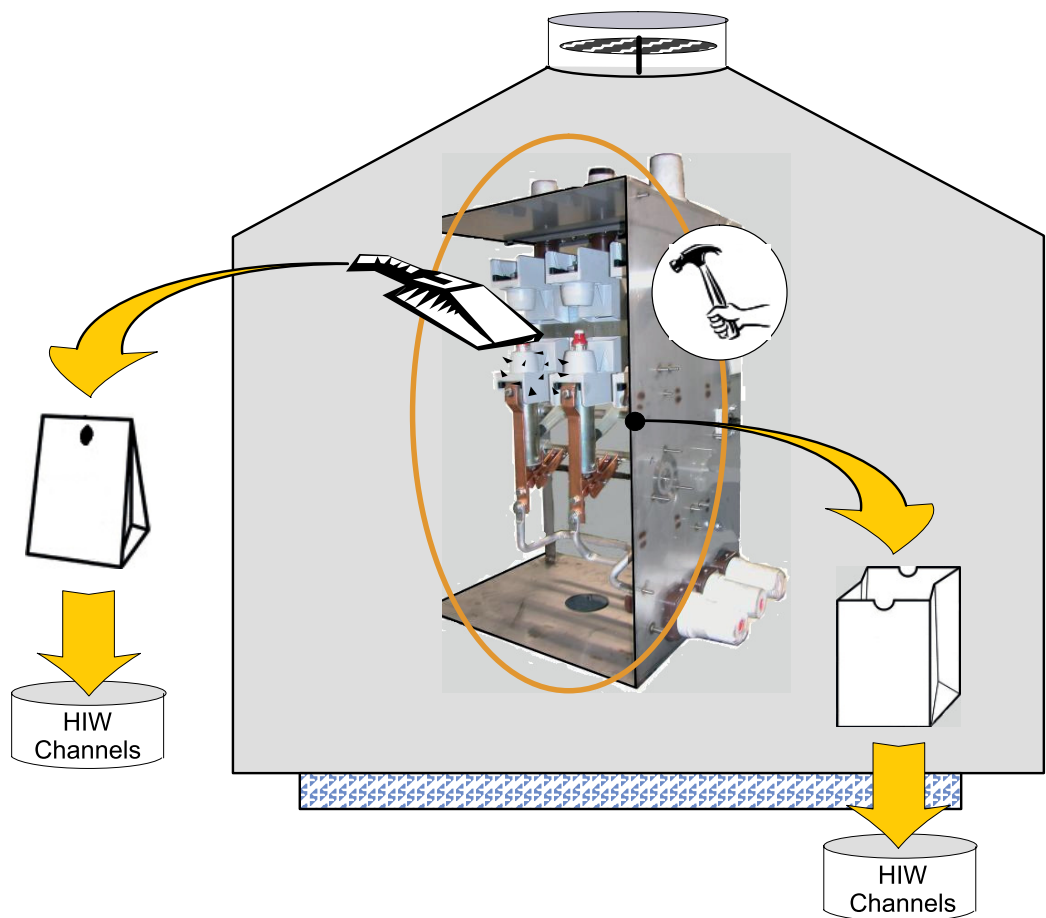
- Remove:
 - The pallet via the wood recovery channels.
 - The full basement and mechanical commands via the ferrous metal recovery channels.

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Opening the Flusarc tank in a dedicated room

Operations	Estimation	Operators
Cut away the rear or side panel from the tank	5 h 00	2
Protect the edges of the cut-out panel with a suitable protective cover		
Vacuum and filter the dust then place it in a plastic bag		
Recover the molecular filter and slide it into a plastic bag		

Principle



Recycling

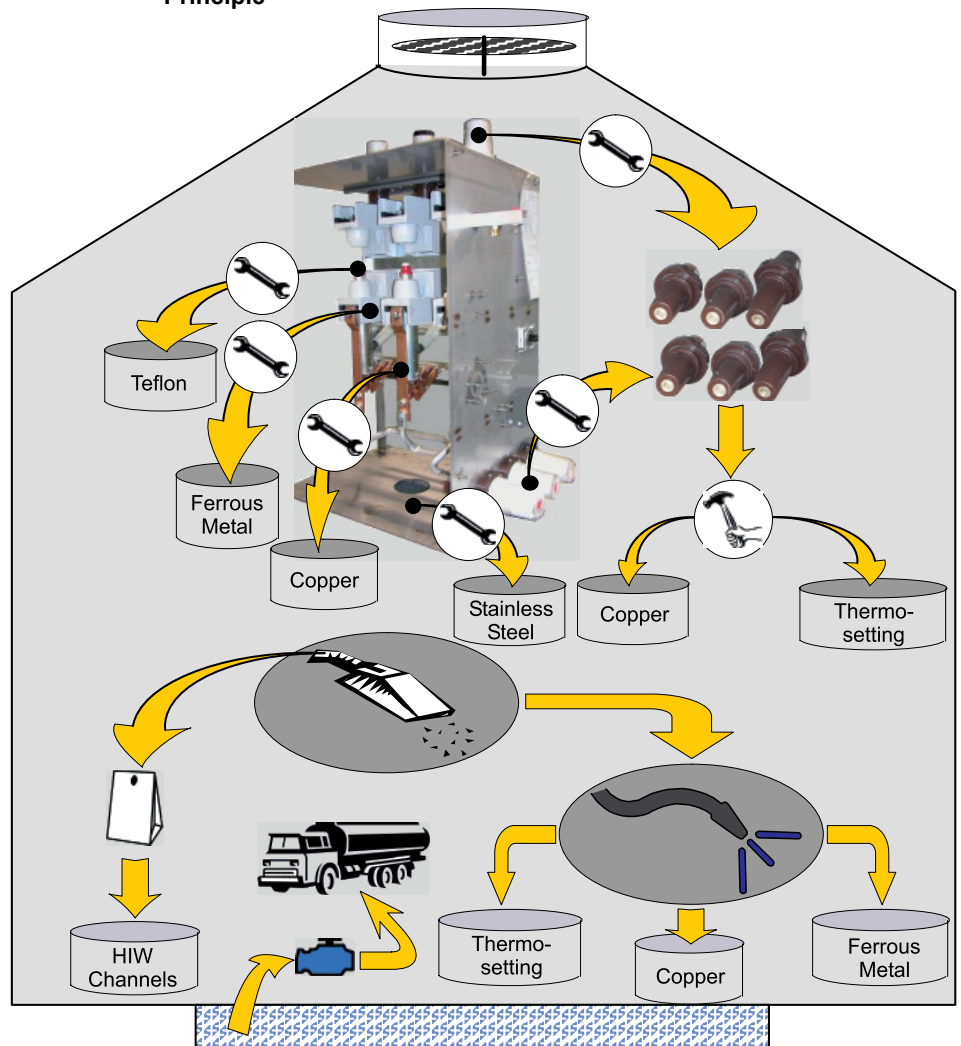
- Remove:
 - The two hermetically-sealed bags (including that for the molecular filter) via the Hazardous Industrial Waste channels
 - The cut away metallic panel via ferrous metal disposal channels

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Dismantling the internal fittings within a function (Example for the C function)

Operations	Estimation	Operators
Remove then dismantle the six HV bushings	16 h 00	2
Dismantle the interrupter switch and the Teflon nozzles		
Dismantle the copper bars		
Vacuum all parts as well as the inside of the tank itself		
Wash all parts as well as the inside of the tank itself		

Principle



Recycling

■ Remove:

- The Teflon nozzles via the appropriate channels
- The bars via the Copper disposal channel
- The interrupter switch via ferrous metal disposal channels
- The tank via stainless steel disposal channels
- The cross-member debris via the copper, thermoplastics and thermo-hardening product channels
- The bag of dust via a Hazardous Waste disposal channel
- Polluted liquids to a treatment centre

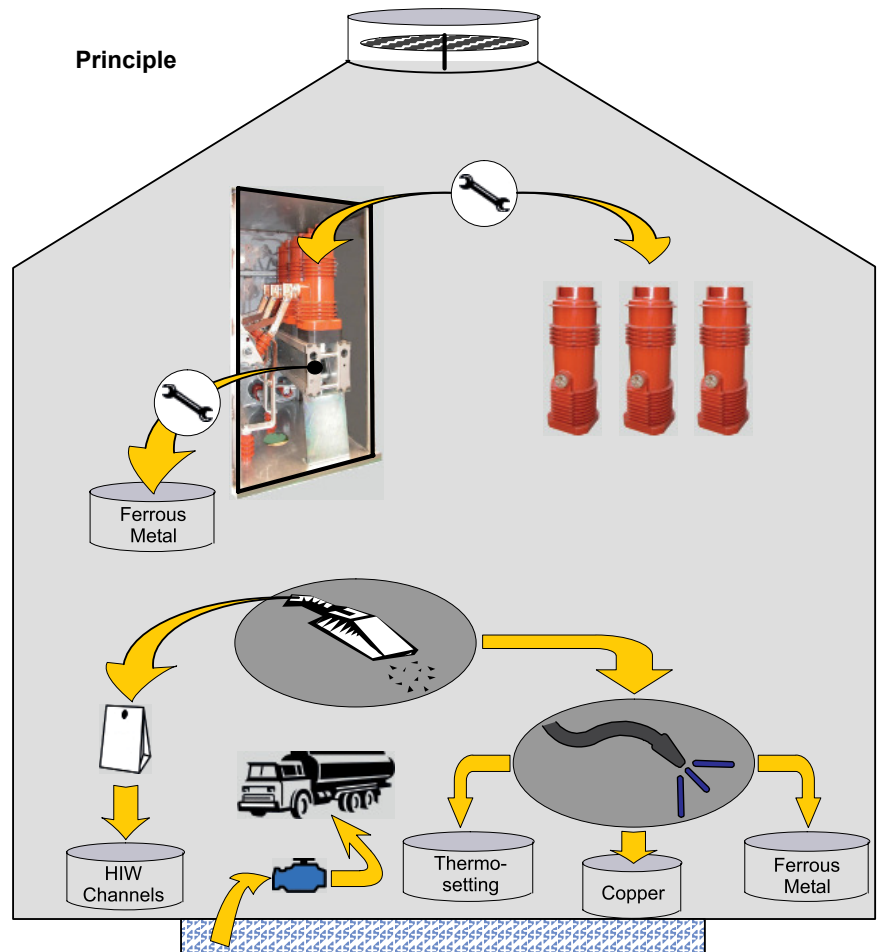
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Specific dismantling operation for the Circuit Breaker function



Operations	Estimation	Operators
Remove the complete mechanical control mechanism after checking that the springs have been released N.B.: Do not attempt to dismantle the mechanical commands without suitable tools to release the tension in the compression springs	8 h	2
Dismantle the pole drive rod linkage		
Remove the 3 poles from the chassis		
Remove the chassis		
Vacuum the removed parts and filter out the dust, which should be placed in a plastic bag		
Recover the molecular filter and slide it into a second plastic bag		
Wash the parts		

Principle



Recycling

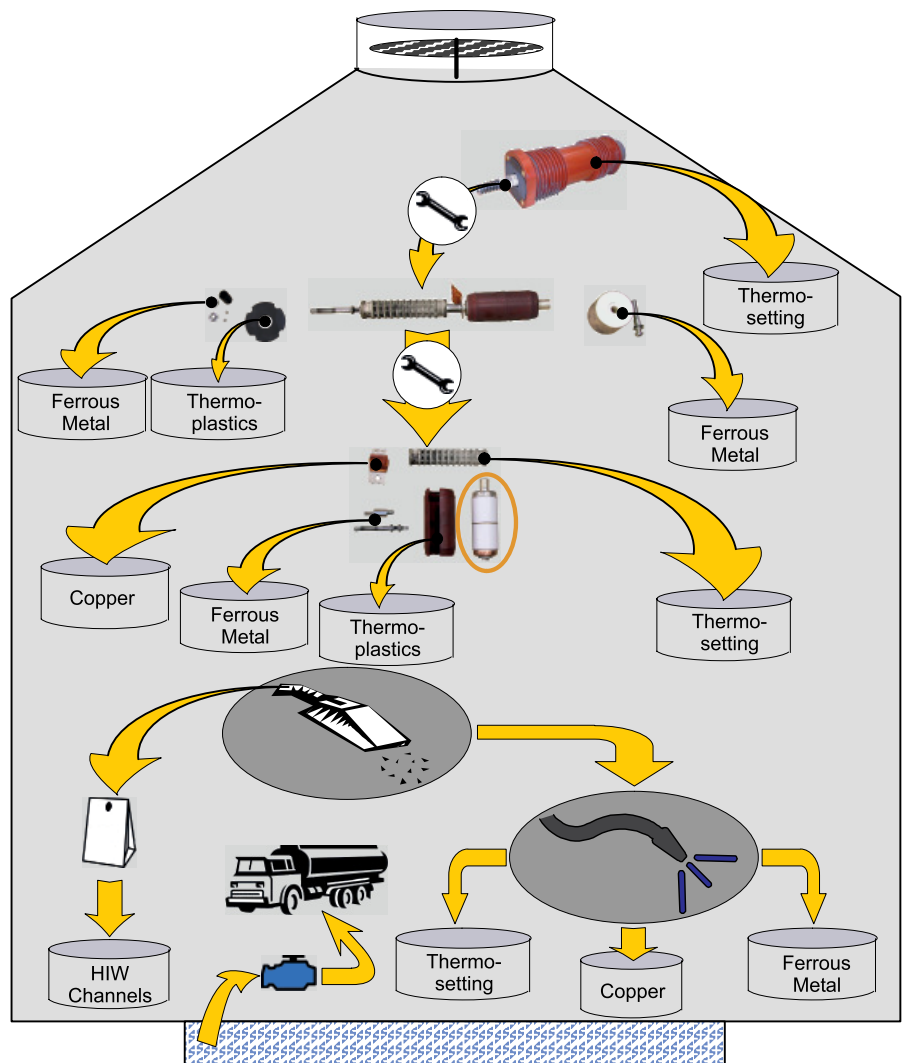
- Dispose of, via ferrous metal disposal channels:
 - The mechanical controls and circuit breaker chassis
 - The connecting tie-rods with their corresponding fasteners
- Remove:
 - The bag of dust via a Hazardous Waste disposal channel
 - Polluted liquids to a treatment centre

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Extracting the breaking switch from a pole

Operations	Estimation	Operators
Fit the pole to a suitable mount	2 h 00 x 3	2
Remove the lower plate		
Unscrew the upper assembly maintaining bolt		
Remove the breaking section and its fittings		
Vacuum clean the parts removed and filter the dust, which should then be placed in a plastic bag		
Wash the parts		

Principle




Recycling

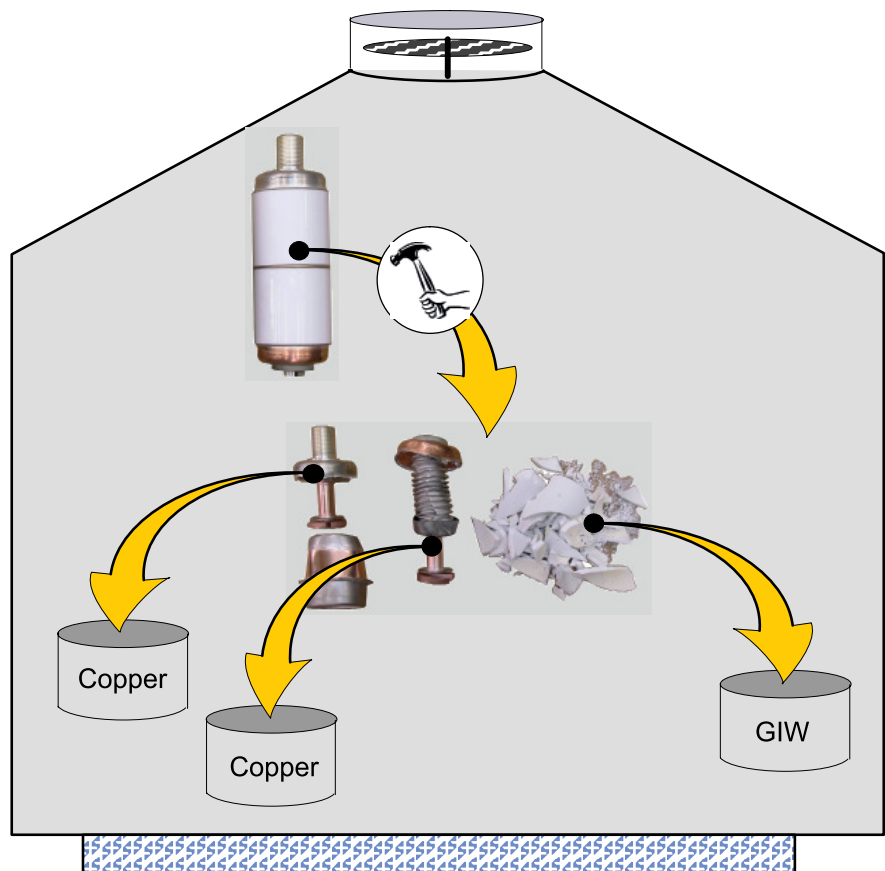
- Dispose of the waste in accordance with its category (copper, thermoplastics, etc.)
- Dispose of the hermetically-sealed bag via a Hazardous Waste disposal channel
- Recover the polluted liquids and dispose of them via a treatment centre

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Dismantling of vacuum bottles

Operations	Estimation	Operators
 Break the bottle enclosing the electrical contacts <u>N.B.</u> : Take all safety precautions necessary for carrying out this operation. Ceramic is a very hard and sharp material	1 h 00 x 3	2
Separate and sort the components		

Principle



Recycling

- Dispose of the waste in accordance with its category (copper, GIW (General Industrial Waste), etc.)

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Definitions

IWMF (Industrial Waste Monitoring Form): A form, issued by Schneider Electric or the carrier, accompanying the Hazardous Industrial Waste until its arrival at the elimination site.

SWPSC (Stabilised Waste Permanent Storage Centre): A site designed to hold waste products either on the surface or buried underground. Temporary storage facilities on the production site or those used for the collection of waste or for temporary storage prior to elimination, if the period of storage remains less than one year, are not considered to be Permanent Storage Centres.

- Class 1: Hazardous Waste (final, stabilised waste products)
- Class 2: Non-hazardous Waste (household and similar waste products)
- Class 3: Inert waste (gravel and backfill)

Waste: Designates all substances or objects that the holder must dispose of or has the intention or obligation of disposing of. Final waste is a waste product that is no longer liable to be processed under the technical and economic conditions at that time.

Dismantling: Dismantling is a more complex process, requiring the use of specific tools (chain saws, drills, etc.) and additional safety restrictions (protections, fire permits, etc.) Pieces will have to be dismantled if they are riveted, welded, glued, etc.

Disassembly: Elements to be disassembled are those that can be separated without destroying the mountings using conventional tools. These include parts that are bolted, click-fit, sleeve-fit, etc.

G.I.W (General Industrial Waste): Waste products collected and treated without the requirement of specific precautions. They are assimilated with domestic waste. This group includes, in particular, household waste such as paper, carton, plastics, wood and metal.

H.I.W. (Hazardous Industrial Waste): Waste products presenting a potential risk to the environment. These are collected and treated separately from general industrial waste products to minimise their impact on the environment and to recover any elements capable of being reused or energetically valorised. This covers, in particular, oils, solvents, used chemical products.

Elimination: A term relating to any operation not meeting the conditions of valorisation, or re-use.

Processing: Designates enhancement or elimination, including intermediate treatment operations.

Recycling: This involves the treatment of materials contained within waste using a production-based process so as to allow them to be reused or incorporated into new products, materials or substances.

Re-use: The use of products or components in identical roles to those for which they were designed, without having to resort to prior processing, except for cleaning or repair work.

Valorisation: All waste processing which meets the following criteria:

- The waste is used to replace other resources
- Use of the waste as a genuine substitution.
- Efficiency criteria
- Global negative environmental impact reduction
- Conformity to regulations and standards
- Maximum possible reduction in the formation and dispersal of hazardous substances

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Waste processing

After disassembly (or dismantling), the recovered elements must be forwarded for treatment in the following manner:

Materials		Weight		Redevelopment (kg)	Incineration		SWFSC (kg)	Loss (kg)
		kg	%		kg	MJ		
Metals	Steel	219.49	53.33	208.51			10.98	
	Stainless steel	119.95	29.14	113.95			6	
	Copper	15.84	3.85	14.25			1.59	
	Other metals (principally non-ferrous)	5.51	1.34	4.68			0.83	
	Total	360.79	87.66	341.39			19.40	
Thermoplastics		9.08	2.21	5.90	3.18	111.30		
Thermosetting plastics	Epoxy	38.34	9.31				38.34	
Gas	SF ₆	3.15	0.77	3.12				0.03
Other		0.22	0.05					0.22
	Total	411.58	100	350.41	3.18	111.30	57.74	0.25
Percentages				85.14 %	0.77 %		14.03 %	0.06 %

These values are calculated from the Flusarc 36 switchboard weighting 411.58 kg, using the working hypotheses of the associated Schneider Electric environmental study concerning the end of life scenario. The figures could be improved if all end of life procedures listed above would be followed. The actual values may vary a little from one product to another.

Destination of waste products

Type of Waste	Destination	Recommended processing
SF ₆ gas	Supplier	Recovery, storage and regeneration
Steel & Stainless steel	Local recovery agent	Shredding, sorting and recycling
Non-ferrous metals	Local recovery agent	Shredding, sorting and recycling
Epoxy Resin	Cement plant	Revalorisation at a lower added value
Thermoplastics	Local recovery agent	Incineration
Molecular sieve	Authorised network	Elimination
Soiled protective equipment	Authorised network	Incineration
Cables	Local recovery agent	Separation of sheathing and conductors

Customer Information

The regularisation of the administrative monitoring for the end-of-service phase of the Flusarc 36 switchboard is achieved through the preparation of an Elimination (or destruction) Certificate or an Industrial Waste Monitoring form. This document is transmitted to the customers to inform them that all materials taken back by Schneider Electric have been eliminated.

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Notes

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Notes

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