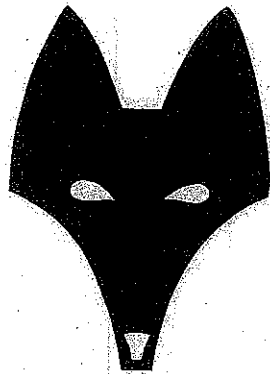


From cable to cash



FIREFOX

Technical Description

FIREFOX

Turbo

Cable Recycling Plant

Flow Chart 03-247

Average infeed capacity for mixed copper cables:
1.3 tons/hour

SYSTEM
REDOMA®



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Flow Chart 03-247



MACHINE SPECIFICATION

ROUGH CHOPPING:

- Item 10 1 **Rough Chopper RC 90-1080**
For chopping of the cable into smaller than fingersize.
• Mounted on a massive steel base plate.
• Hopper opening 1700 x 1710 mm, preferably fed by means of a cactus grab.
• Massive rotor, Ø 450 x 1080 mm, with 3 rows of 8 rotor knives each.
• Cutting housing with 1 knife retainer holding 9 knives.
• Easy access to and quick replacement of knives and screen.
• Normally equipped with a screen with holes Ø 20 mm.
• Transmission: Motor 90 kW - poly-V-belt drive - flywheel with friction coupling.
- Item 11 1 **Outfeed Belt Conveyor** BF 500 x 2200/10°
Drum motor 0.37 kW. Mobile.
- Item 12 1 **Belt Conveyor** BF 500 x 4500/30°
Drum motor 0.55 kW.
- Item 13 1 **Over-Belt Magnet UMP 500**
For ferrous separation. With built-in permanent magnet.
To be mounted on item 12. Drum motor 0.33 kW.

INTERMEDIATE STORAGE:

- Item 20 1 **Storage Bin with Vario-Conveyor VF 2600**
For intermediate storage and dosing of pre-chopped cable.
• Bin (volume 2.6 m³) with hand-operated sliding damper.
• Discharging bottom made of steel aprons in lamellar structure, mounted on chains.
• Variable speed motor 3.0 kW and pilot motor 0.065 kW with remote control.
• Variable speed with analog display.
• With 4 support legs.
- Item 21 1 **Belt Conveyor** BF 500 x 6500/30°
Drum motor 0.55 kW.
- Item 22 1 **Over-Belt Magnet UMP 500**
Same as item 13. To be mounted on item 22.

GRANULATION:

- Item 30 1 **Two-way Diverter**
manually operated, with floor support.



Item 31 A+B **2 Granulators GR 45**

For chopping of the cable down to granule size. With following main parts:

- Supporting framework
- Granulator housing with two fixed knives and infeed and outlet hopper
- Rotor 660 mm long with 2 x 5 knives
- V-belt drive with flywheel and motor 45 kW.
- Limit switch.
- Knives and screen are easily accessible for quick replacement.
- Rotor knives are pre-adjusted in a jig.
- The fixed knives can be turned, allowing all 4 edges to be used.
- The housing is fitted with a replaceable, wear-resistant bar and with wear-resistant end discs.

Item 32 1 **Set of Transport Tubes** Ø 160 mm

For pneumatic transport. With quick couplings, supports and fittings.

Item 33 A+B: **2 Feed Blowers GF 11**

For cooling of the granulators and pneumatic transport.

- Blower housing with replaceable wear linings.
- Rotor with replaceable hardened flat bars.
- V-belt drive with motor 11 kW.
- In- and outlets suitable for transport tubes Ø 160 mm.

SEPARATION:

Item 40 1 **Cyclone** Ø 800 x 1800 mm

For separation of the air from the granules.

With support, 2 inlets Ø 160 mm and inspection cover.

Item 41 1 **Rotary Valve ZS 300**

For discharging. Chain drive with geared motor 0.75 kW.

Item 42.1 1 **Separator SE 120 - "The Eagle"**

For separation of metals from insulation. Consisting of following main parts:

- Eccentric drive with electronic speed regulation and 1.5 kW motor.
- Separating table with adjustment of longitudinal and transversal inclinations.
- Easily replaceable separating deck.
- Outlet channel with 6 outlets and 5 adjustable flaps.
- Extractor hood with controlled damper.

Item 42.2 1 **Blower BL7.5 for Separator**

V-belt drive with motor 7.5 kW and air intake filter.

Item 43 1 **Belt Conveyor BC 200 x 3500**

For transport of the intermediate fraction.

Made of steel with 2 floor supports. PVC-belt with Flexowell skirts and flight bars. Geared motor 0.37 kW with flexible coupling.



- Item 44 1 **Diverter**
For chosing between regranulation or not regranulation of the intermediate fraction. Manually operated.
- Item 45 1 **Belt Conveyor** BFM 300 x 1800/15°
For ferrous separation.
With a built-in permanent drum magnet and drum motor 0.33 kW.
- Item 46 1 **Screw Conveyor** Ø 100 x 4000
For transport of insulation.
With 2 floor supports, infeed hopper, V-belt drive with motor 1.1 kW
- Item 47 1 **Two-way Diverter**
For filling of bins. Manually operated.

DUST EXTRACTION:

- Item 50 1 Set of **Dust Extraction Tubes**
For conveying dusty air. Supports and fittings included.
- Item 51 1 **Air Extractor** rated at 18.000 m³ air/h.
For transport of dusty air.
V-belt drive with motor 30 kW. Self-cleaning fanwheel.
- Item 52 1 **Dust Cyclone** Ø 1400 x 3600 mm
For separation of air from dust. With inspection cover.
• Floor support with double door and covered with galvanized sheet.
• Separates approx. 98% of the dust. Only 2% goes to the filter.
• Total height 6300 mm.
- Item 53 1 **Rotary Valve** ZS 300
For discharging dust into a bin. Chain drive with geared motor 0.37 kW.
- Item 54 2 **Filter Bag Houses**
For collection of dust and cleaning of the air.
• Each filter unit has a supporting frame, 25 filter bags and dust collecting bin.
• For automatic cleaning the filter bags are vibrated at variable time intervals by means of a vibration motor 0.18 kW.

ELECTRICAL:

- Item 60+61 2 **Control Panels** in accordance with IEC standards with lamps, start and stop push-buttons, all necessary relays, protections, etc. With Star-delta starter as from 7.5 kW.

Mains voltage: 3 x 400 V, 50 Hz
Control voltage: 1 x 230 V, 50 Hz
Other voltages and frequencies on request.



PROCESS DESCRIPTION

General information

The quality of the recovered end products will depend on the quality and purity of the cable which is fed into the plant. Optimum recovery in terms of capacity, wear and tear, and purity of recovered end products is achieved by a correct interaction of the following process operations:

- Purchase of cable
- Pre-sorting
- Pre-cutting
- Rough chopping
- Granulation
- Separation
- Utilization of recovered metals

Purchase of cable

Already at this stage the cost-effectiveness of the recycling can be influenced. Whenever possible the cable should be delivered already separated according to type and quality, and should not be unnecessarily mixed. Cable that is suited for the plant should be purchased.

Pre-sorting

The cost-effectiveness of the plant is very much dependent on the pre-sorting of the cable. This will determine both the capacity and the quality of the end products. Therefore it is recommended to separate the cable into main types immediately on delivery by trucks or railway. At the same time foreign materials which are easy to sort away should be removed, e.g. insulators, stones, tools, metal objects.

Pre-cutting

Stiff cable with outer diameter larger than 40 mm should be pre-cut into pieces of approx. 0.7 m in length. Thinner cable can be fed directly into the rough chopper by means of a crane equipped with a cactus grab. On special request an additional infeed conveyor for the rough chopper can be installed.

Rough chopping

In the rough chopper the cable is chopped into pieces smaller than finger-size before it is manually or automatically fed into the granulator. Before entering the granulator most of the steel pieces are removed by means of over-belt magnets.

Granulation

In the granulator the cable is cut so small that the wires are set free from the insulation. This results from the cutting interaction between rotor knives and fixed knives and also between rotor knives and the screen.

Separation

In the separator the granules are separated into metals and insulation material, and also an intermediate fraction that recirculates. This is achieved mechanically through vibrational movement and air flow. A belt conveyor with a drum magnet will guarantee iron-free copper.



Utilization of recovered metals

The size of the granules and the degree of impurities allowed (foreign metals and insulation) will depend on the price and the intended use of the recovered metals.

Dust extraction

Approx. 98% of the dust is collected under the dust cyclone and only 2% goes into the filter bag houses.

Installation

Installation is done by the customer's personnel under the instruction of a REDOMA supervisor. All wiring between the power net and the control panels as well as between the control panels and the machines have to be done locally by authorized electricians and at the customer's expense.

Foundation

The plant should preferably be erected in a hall with normal armoured concrete floor.

Cable which can be processed with certain reservations

- When mainly rubber cable is processed, the capacity has to be reduced to about 70%.
- Copper/lead cable as well as copper/aluminium cable can be granulated, but the different metals cannot be separated. It is recommended to strip these types of cable and then, if necessary, to process them separately in the FIREFOX plant. However, additional equipment for separation of copper from lead can be installed.
- Cable with sticky filler (like chewing gum) tends to block the screen holes of the granulator. However, by adding a special absorber this type of cable can also be processed but with a lower capacity.
- Cable with wire diameter smaller than 0.2 mm, e.g. hair wire, results in loss of copper in the insulation. This can, however, be recovered to a large extent with additional screening equipment.
- ACSR cable (Fe/Al wire) has to be pre-cut first and then chopped in the rough chopper. This material causes a lot of wear and tear on the knives and screen.

Necessary additional equipment

For optimum handling the following equipment may be required, depending on the type of cable and to what extent it has been pre-sorted and pre-cut:

For pre-handling:

1 Alligator shear

1 Portable hydraulic shear

Required for certain cables: 1 Cable stripping machine

For internal transports:

1 Palette truck and/or

1 Fork lift truck

Drums and bins for metals

Skips for insulation and dust

1 Weighing machine



For feeding of Rough Chopper:

1 Crane with cactus grab; or alternatively, the machine can be fed by means of a belt conveyor

TECHNICAL DATA

Specification

Average capacity for:

- mixed copper cable 1.3 t/h
- telephone cable 1.0 t/h
- power cable 2.1 t/h

Floor space for machines (service space included) 150 m²

Recommended size of building min. 500 m²

Highest point of plant (dust cyclone) 6300 mm

Required indoor height for crane
over the rough chopping area min. 6000 mm

Installed power 250 kW

Average power consumption 180 kW

No. of operators for plant 1 person

No. of assistants for:

- pre-sorting and pre-cutting 2 person
- rough chopping 1 person

Transport volume 2 trailers

Weight of plant 26 t

Purity of copper granules

mixed copper cable	99.5%
telephone cable	99.8%
power cable	99.9%
oily cable from oil fields	99.9%

If there is a relatively large amount of rubber insulation, the above values will be approx. 0.5% lower.

Comments

- For rubber cable the capacity will be approx. 30% less than stated above.
- The rough chopper with a screen having hole diameter 20 mm has a capacity of approximately 2.4 t/h for mixed copper cable, i.e. higher than that of the plant.
- The number of persons required for pre-sorting, pre-cutting and possibly cable stripping can vary significantly depending on the type of cable.



TECHNICAL DATA

for FIREFOX Turbo (2 Granulators)

Time required for screen and knife replacement:

	Screen	Knives
Rough chopper	20 min	5 h
Granulator	10 min	1½ h
Pre-adjustment of granulator rotor knives in external jig	—	30 min

Knife wear: Throughput between knife sharpening

Rough chopper (mixed copper cable)	300 t
Granulator (mixed copper cable)	2 x 30 t

Screen wear: Throughput between screen replacements

Rough chopper (mixed copper cable)	4000 t
Granulator	2 x 300 t

Regrinding of knives:

	Rotor knives	Fixed knives
Rough chopper	6–8	6–8 times
Granulator	8–10	6–8

Above-stated data for capacities and wear are average values and may vary depending on the type of cable.



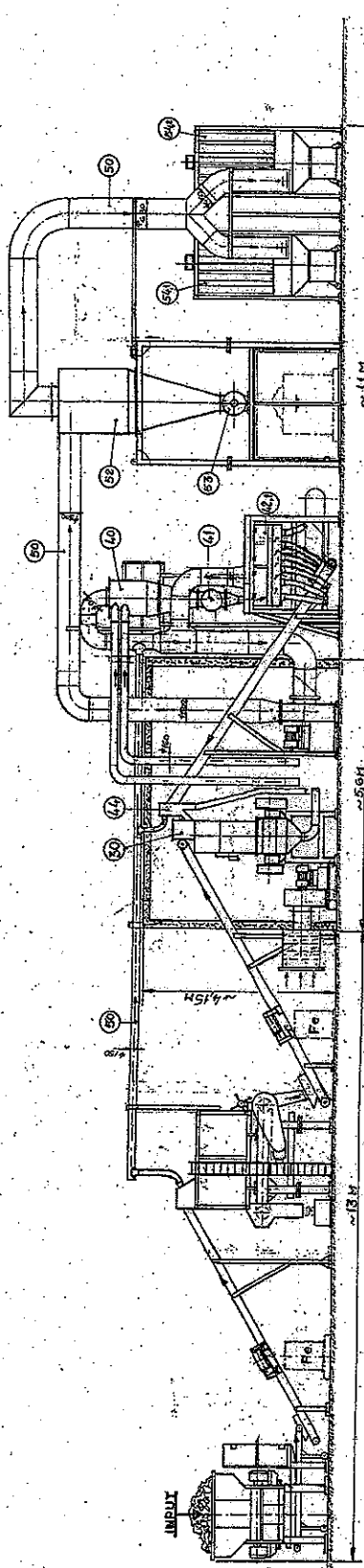
SPARE PARTS

FIREFOX Turbo (with 2 Granulators)

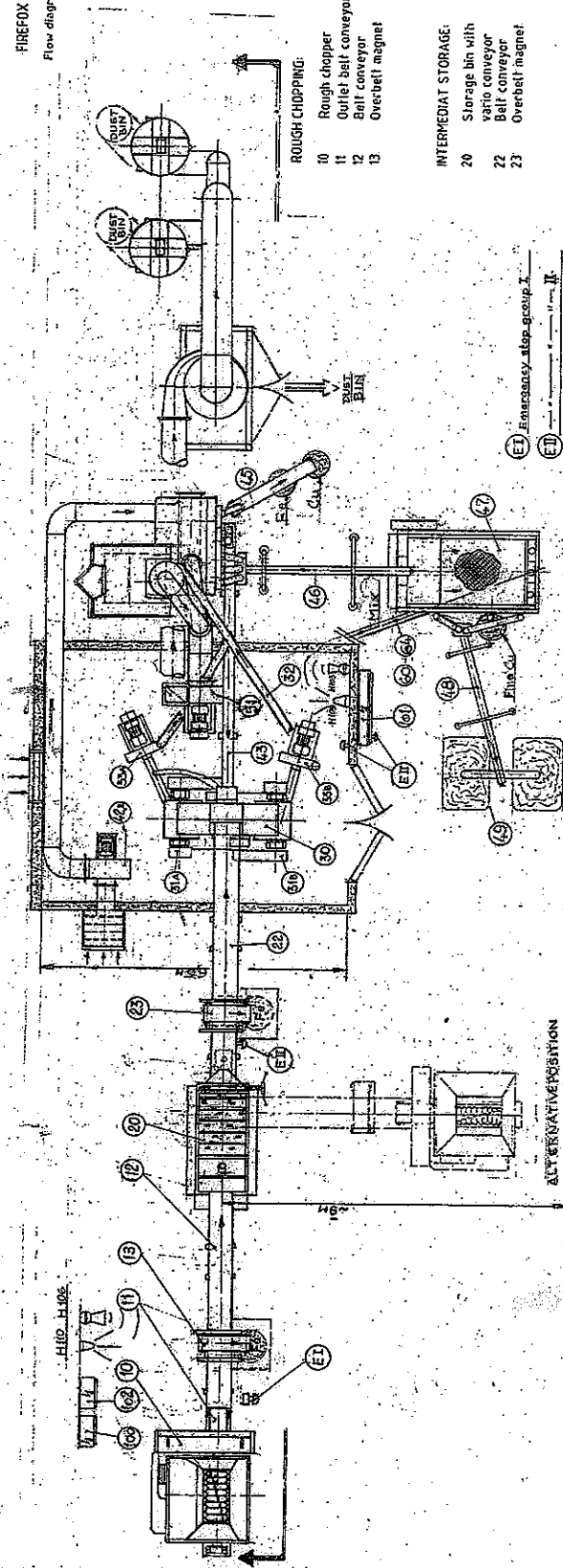
Recommended for delivery together with the plant:

Item 10	Rough chopper	2 sets of knives 1 screen 1 set of Allen screws for knives 1 set of special washers for rotor knives
Item 31	Granulators	2 x 3 sets of knives 2 x 3 screens
Item 42.1	Separator	1 deck, complete with 50 micron covering for hair wires 1 air intake filter 1 set of leaf springs

With reservation for technical alterations.



FIREFOX TURBO
Flow diagram 03-247



SEPARATION:

- 40 Cyclone
- 41 Rotary valve
- 42.1 Separator
- 42.2 Blower for separator
- 43 Belt conveyor
- 44 Diverter
- 45 Belt conveyor for FE separation

SCREENING:

- 46 Screw conveyor
- 47 Screening machine
- 48 Screw conveyor
- 49 Two-way diverter
- 60-64 Pneumatic transport of linked fraction

DUST EXTRACTION:

- 50 Dust extraction tubes
- 51 Air extractor
- 52 Dust cyclone
- 53 Rotary valve
- 54 Filter bag house

ELECTRIC:

- 100 Control panel
- 101 Control panel
- 102 Control panel

ROUGH CHIPPING:

- 10 Rough chopper
- 11 Outlet belt conveyor
- 12 Belt conveyor
- 13 Overbelt magnet

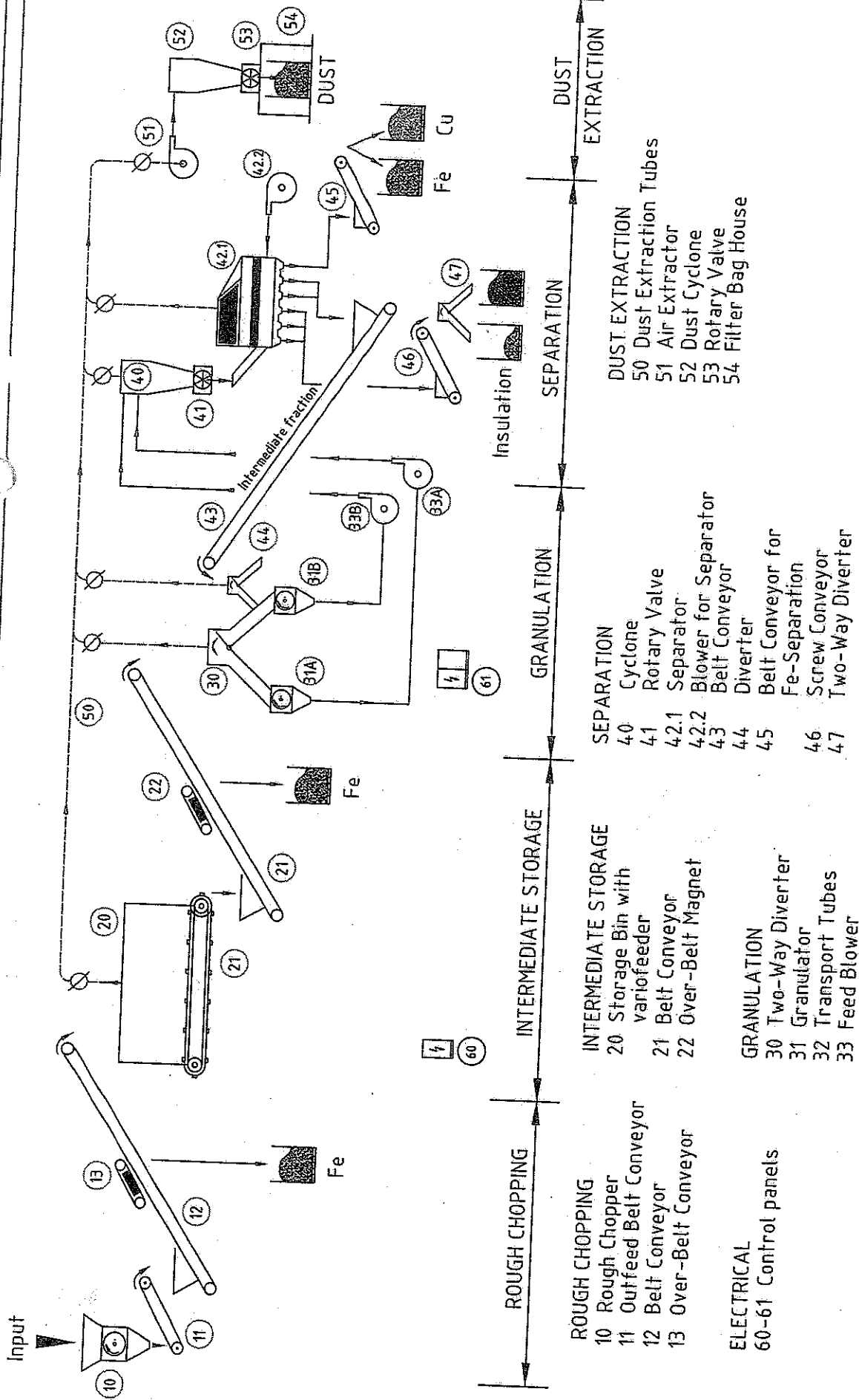
INTERMEDIATE STORAGE:

- 20 Storage bin with vario conveyor
- 22 Belt conveyor
- 23 Overbelt magnet

GRANULATION:

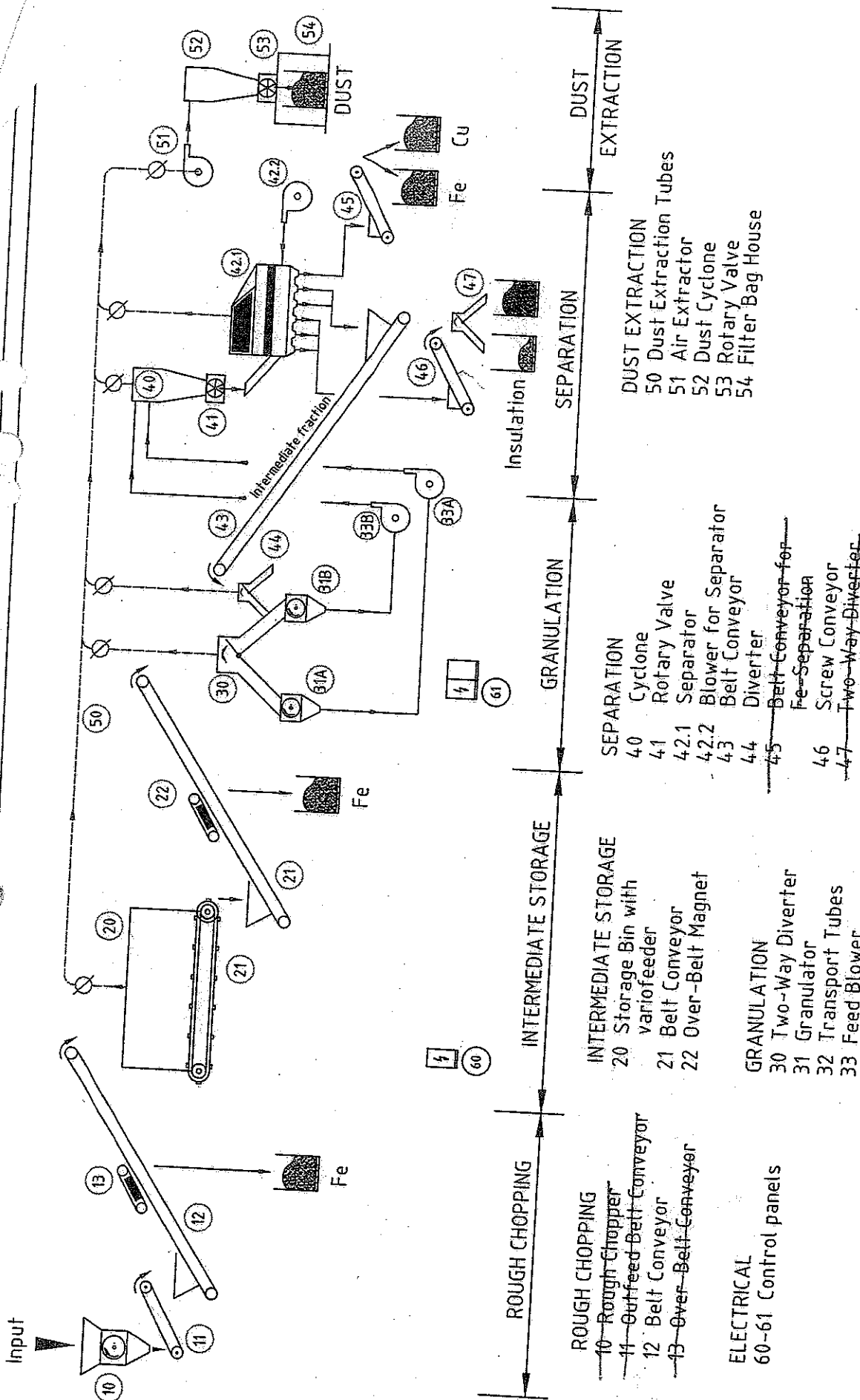
- 30 Two-way diverter
- 31 Granulator
- 32 Transport tubes
- 33 Feed blower

Cable Recycling Plant FIREFOX TURBO				Component list Stuckliste
Layout Drawing / Stelplan				Drawn by WGa
SYSTEM REDOMA®				Scale 1:100
				Date Dec. 2005
				No. 11-131

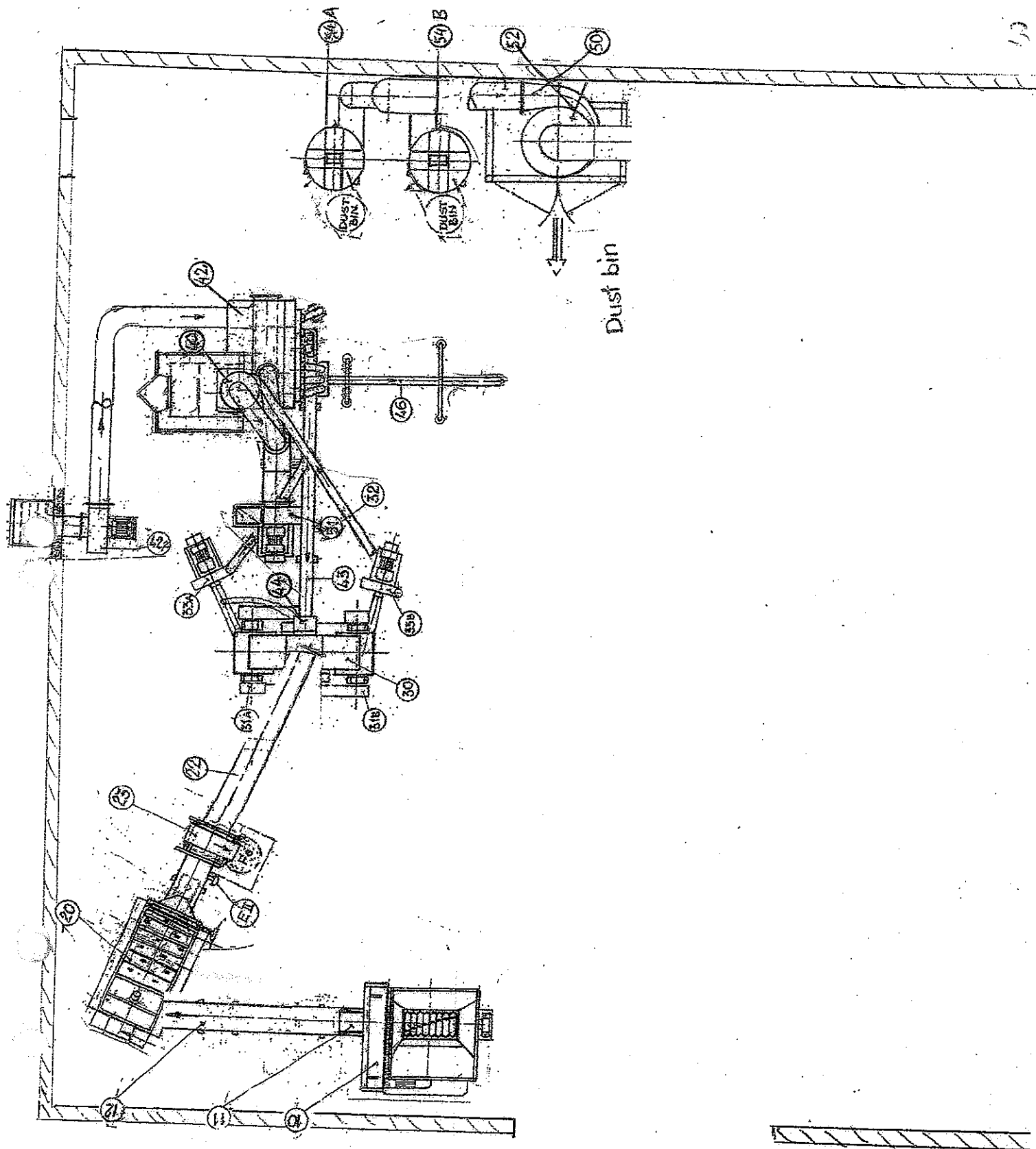


FIREFOX TURBO		Substrate Comp. list
RECYCLING PLANT FOR CABLE SCRAP		Gez. Drawn by BB
RÜCKGEWINNUNGSANLAGE FÜR KABELABFALL		Nr. 11:2005
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SYSTEM REDOMA®		

NOTE: LAYOUT DOES NOT SHOW ALL PIPING, ELECTRICAL COMPONENTS, SERVICE-PLATFORMS AND STAIRCASES. WITH RESERVATION FOR TECHNICAL ALTERATIONS!



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