

Scope of Supply

Primary Crusher: Qty (1) Eccentric Roll Crusher ERC® 18 – 14

Scope of Supply

ITEM	DESCRIPTION	QTY
BASE CRUSHER		
C-1	Eccentric Roll Crusher ERC® 18 – 14 - Crusher Housing, - Jaw, hydraulically supported - Eccentric Crushing Roll - Hydraulic Gap Adjustment and Overload Protection System - Jaw Hood - Integral grizzly	1
	Drive Components with guard	1
	Automatic Grease Lubrication System	1
	Standard maintenance tools	1
	Crusher base frame incl. partial lining	1
	Pre-assembly of major parts	1

Detailed Basis of Design

Site Location and Climatic Condition

DESCRIPTION	DETAILS
Site Location	Germany
Altitude, mASL	< 1,000 m a.s.l. (assumed)
Temperature, °C (Min / Max)	-20°C to +35°C (assumed)

Design Data

DESCRIPTION	DETAILS	
Material Type	Unknown	
Material feed Description	Free flowing (assumed)	
Ore specific gravity (design)	2.5 t/m ³ (assumed)	
Ore Bulk Density (design)	1.6 t/m ³ (assumed)	
Moisture content (max)	3 %	
Clay Content (maximum):	Nil (assumed)	
Feed Material Screened: (Yes / No)	No	
Bond Crushing Work Index (CWi)	11 kWh/t (assumed)	
Compressive Strength	120 MPa (assumed)	
Gap setting CSS	Approx. 100 mm (Range: 70 - 220 mm)	
Feed Size F100*	900 mm	
Feed size distribution*	Size [mm]	Passing [%]
	900	100
	800	98
	500	90
	330	74
	305	70
	279	65
	254	60
	229	55
	203	50
	178	42
	152	35
	127	29
	102	23
	76	18
	51	13
38	11	
25	9	
19	8	
2	3	
Throughput capacity – Nominal	≥ 450 tph	
Product size (P80)*	≤ 110 mm	

Electrical and Instrumentation

DESCRIPTION	DETAILS
Standards	IEC
HT Voltage	N/A
LT Voltage	400 V (assumed)
Frequency	50 Hz (assumed)
Control Voltage	24 V DC
Analog Signals	Analogue: 4-20 mA; Digital: 24 V DC

Sizing basis:

The estimates on the selection and size of our proprietary equipment included herein are based on the information provided by Customer and our general knowledge of mineral behavior obtained from our project database and from results of laboratory tests on similar materials over time.

Technical Description

Operating Principle

The Eccentric Roll Crusher ERC® 18 – 14 is a compact, reliable and powerful crusher for primary crushing applications with a compact design including an integrated scalping grizzly.

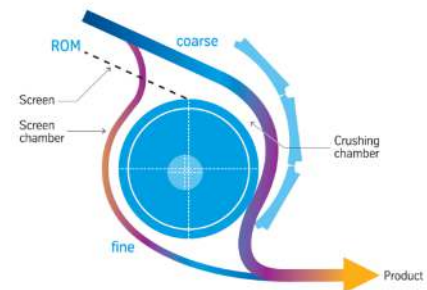
Below figure 2 shows the principle sketch of the Eccentric Roll Crusher. The eccentrically arranged crushing roll is located between the crushing chamber and the scalping grizzly (screening chamber). The crushing chamber is equipped with an adjustable jaw.

The feed material (ROM = Run of Mine) will be fed in a large inlet area, by a feeder (i.e. apron feeder, vibrating feeder, push feeder etc.). This feed material will be divided into two partial material flows. The undersize material will pass through the screen chamber and fall onto the discharge conveyor. The scalped oversize material will be transported into the crushing chamber and will be crushed between the eccentrically moving crushing roll and the adjustable toggle (fixed jaw). The crushed material returns to the same discharge conveyor as the pre-scalped fines (crushed material falls onto the layer of scalped fine material).

Due to the eccentric crushing roll movement, the stroke in the crushing chamber on every point in the crushing chamber the same. This principle leads to higher crushing intensity and better crushing results compared to other crusher types.



Exemplary 3D picture of ERC®



Principle of the Eccentric Roll Crusher

One of the significant advantages of this crusher principle is the integral grizzly before the crushing chamber. The pre-scalping and by-passing of fines reduces the crusher's overall power consumption, the wear in the crushing chamber as well as possible compaction issue in the crushing chamber. The amount of moist fines transported to the crushing chamber will be much less as it will be reduced by the integral grizzly. All this improves significantly the efficiency of this Crusher.

The unique curved design of the crushing chamber avoids that slab material will fall directly through the crushing chamber and causes issues in the downstream equipment (chutes, transfer points etc.) Due to this design the Eccentric Roll Crusher produces a more cubical product compared to a common jaw crusher.

Equipment Description

C-1 Eccentric Roll Crusher ERC® 18 – 14

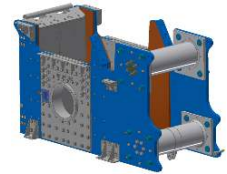
Crusher Housing

The modular crusher housing simplifies transport, assembly and maintenance. The upper and lower support tube are connected to the side wall with bolts and patented conical locking bolts. The side walls of the crusher housing are made of sheet steel and are very stiff thanks to the so-called sandwich construction.

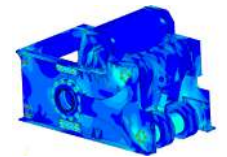
Front and end wall are welded and reinforced to withstand the acting forces.

The rigidity of the crusher housing has been checked by means of FEA-calculations.

Finally, the housing parts are subjected to a stress-relieving heat treatment.



Crusher Housing



Example for FEA printouts

Jaw, hydraulically supported

The Jaw mainly consisting of:

- The fixed jaw made of high quality reinforced cast structure
- The replaceable upper and lower jaw liners, made of manganese-alloyed special steel



Hydra Jaw

Eccentric Crushing Roll

The crushing roll mainly consisting of:

- The forged roll body
- The roll liners with replaceable casted segments, made of manganese-alloyed special steel
- The eccentric shaft, made of pre-forged alloyed special steel
- The reinforced self-aligning roller bearings supporting the eccentric shaft in the housing and in the roll, are designed for a longest service life and temporary overload
- Sealing arrangement of the antifriction bearings
- Bearing sleeves are used to ensure easy assembly and disassembly of the bearings and protection of the eccentric shaft.
- Set of Flywheels. Employed flywheels with high moments of inertia are generating a high crushing energy. This keeps the power consumption of the electric motor at a largely constant level and reduces the risk of a standstill of



Eccentric Crushing Roll

the electric motor due to overload. One disk is designed as V-belt pulley with tread grooves. The flywheels are mounted to the eccentric shaft by means of tangent key assemblies.

Hydraulic Gap Adjustment and Overload Protection System

The gap is adjustable by one integral hydraulic cylinder.

This allows optimizing the final product size according to the requirements and to warrant a constant final product despite of any wear.

In case of overload, the increased pressure in the hydraulic cylinder will be released by a safety valve and allows opening the gap very quickly to avoid overload. This patent system allows the adjustment of the gap width over a wide range. Hydraulic unit and ERCmatic will be FAT tested.



Integrated automatic gap adjustment with overload protection

Jaw Hood

The replaceable crusher Jaw Hood mainly consisting of:

- The jaw hood made of a ribbed and reinforced casted and welded steel structure.
- The replaceable crushing jaw liner.
- Wedge for fixing of the jaw hood.

The replaceable Hood allows easy access to the Crushing Roll and Jaw for easy maintenance. The Jaw Hood allows an optimizing feed of the crushing chamber.

Replaceable Hood

Integral grizzly

The Integral Grizzly mainly consisting of:

- The bolted base frame as modular design.
- The rotatable grizzly bars out of wear resistant steel.



Crusher control system ERCmatic

The ERCmatic is a compact and reliable control and monitoring system especially designed for the Eccentric Roll Crusher. The system provides all operating, adjustment and overload monitoring functions required for reliable, trouble-free operation of the gyratory crusher. The unit is designed with 13" touch-screen terminal and features control and interlocking of all motors related to the crusher and monitors all related measuring values from the crusher instrumentation.

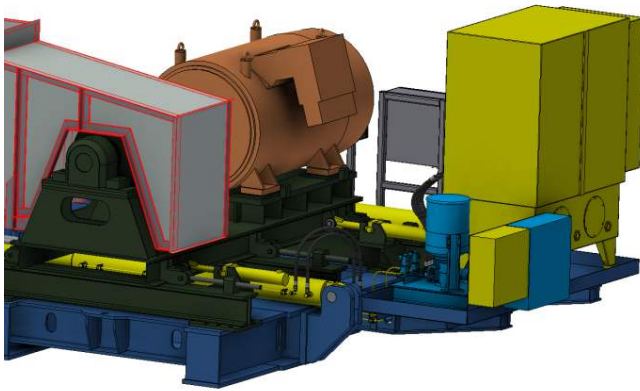
The features of the ERCmatic control system are:

PLC Brand Siemens S7-1500

- Control and interlocking of all motors related to the crusher (signal converter for the power measurement not included)
- Monitoring of pressure, temperature, oil level and oil flow of the hydraulic system.
- Monitoring of crusher speed,
- Automatic operation with individual motor control
- Automatic gap setting by adjustable pressure
- Effective overload protection when adjustable pressure limits are exceeded.
- Menu driven terminal, input of all operating data via touch-screen, visual display of the crusher operation status as picture and in plain text
- Input of main limit values password protected via PIN code, such as maximum power draw, maximum hydraulic pressure, limits for main shaft position, maximum temperatures etc.
- Permanent display of all critical operation parameters
- Registration of operating/ load hours and of load/ pressure peaks
- Fault indication archives for current and historic signals (ring buffer memory)
- Optional: Remote data transmission via modem (Teleservice) for remote servicing
- Bus connection to central PLC via Industrial Ethernet
- Optional remote terminals for hardwired connection to the MCC (if bus connection is not available) can be connected to the ERCmatic.

Drive System with guard

A multiple standard V-belt drive with intermediate shaft provides the link between the crusher and the main electric motor. The drive system will be supplied with a removable guard.



Set of Central Lubrication System with Drive

Main Drive Motor Data (not included in scope)

Motor Type:	Squirrel Cage
Kilowatts:	250 kW
Speed:	approx. 1,000 rpm
Supply:	400 V, 3-phase, 50 Hz
Enclosure:	IP 55
Mounting Type:	Horizontal Foot
Insulation:	Class F
Cooling:	Fan Cooled with Built-in-Air Cooler
Bearing Type:	Anti-friction
Bearing Lubrication:	Grease
Starting method:	DOL - VFD (by others)
Drive type:	V-Belt

Set of Central Lubrication System

The central grease lubrication system ensures an automatic and continuous grease supply to the lubricating points of the crushing roll bearings and the intermediate shaft of the drive.