Nordberg C series jaw crushers

Wear parts application guide

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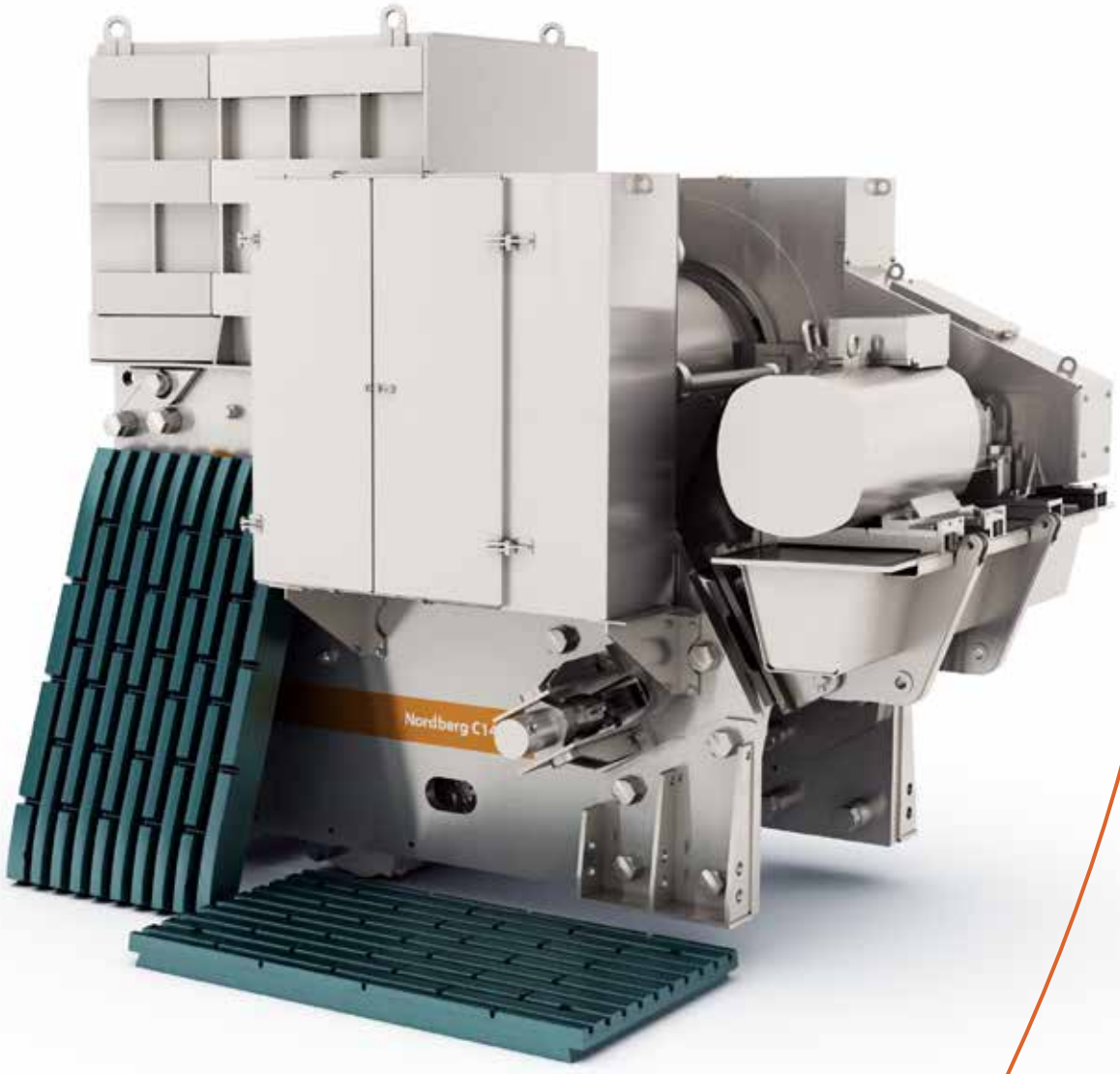
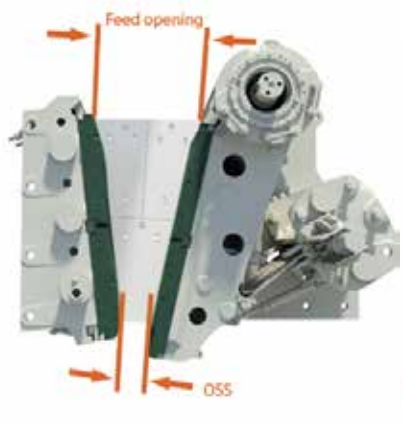
Expect results





Wear parts application guide - Nordberg C series jaw crusher

C jaw crusher and basic concepts

The jaw crusher is a compression type crusher. Feed material is crushed between fixed and movable jaw dies. Large particles are crushed in a single layer, referred to as single-layer crushing. Smaller particles are crushed rock on rock, referred to as multi-layer crushing.

Feed opening

Feed opening (depth of the cavity) defines the maximum feed size of the crusher. In the C jaw crusher, the feed opening is measured from the top of the tooth of the fixed jaw to the bottom of the tooth of the movable jaw in a straight line perpendicular to the center line of the crushing cavity.

The maximum feed size is approximately 80% of the feed opening.

	Feed opening depth		Cavity width	
	mm	in	mm	in
C80	510	20	800	32
C100	760	30	1000	40
C96	600	24	930	37
C106	700	28	1060	42
C116	800	32	1150	45
C3054	760	30	1380	54
C110	850	34	1100	44
C120	870	35	1200	48
C125	950	37	1250	49
C140	1070	42	1400	55
C145	1100	43	1400	55
C160	1200	47	1600	63
C200	1500	59	2000	79

Open side setting (OSS)

The open side setting is measured when the crusher is at rest. The setting is measured either top to top, or bottom to top, depending on the tooth profile of the jaw dies.

Closed side setting (CSS)

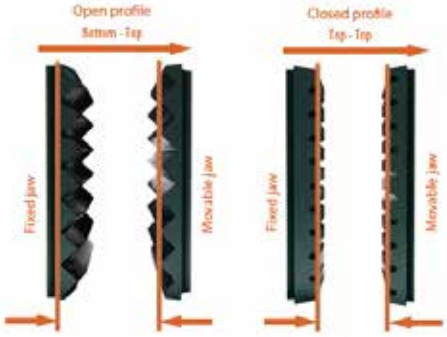
The closed side setting can be calculated by deducting the stroke from the OSS. CSS is the most important crusher parameter since it defines the maximum product size and has significant bearing on capacity, product gradation, power draw, and wear. Check the instruction manual for the permitted minimum CSS.

Dimensions to be deducted from the OSS

	mm	in
C80	24	1
C100	32	1 1/4
C96	32	1 1/4
C106	34	1 5/16
C116	37	1 1/2
C3054	32	1 1/4
C110	36	1 3/8
C120	37	1 1/2
C125	41	1 5/8
C140	41	1 5/8
C145	41	1 5/8
C160	41	1 5/8
C200	50	2

Nip angle

The nip angle is the angle between the fixed and movable jaw dies. Too large a nip angle reduces the capacity and increases the wear as the feed material grinds and gouges the jaw dies in an upwards direction during the compressive stroke of the pitman.

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Nordberg C150

How to operate a C jaw crusher

In order to get optimum capacity and maximum lifetime of wear parts, consider the following points:

1. Check the feed size

• Oversize feed material decreases capacity and can cause unnecessary stresses to the crusher components.

• Small feed size increases wear at the bottom of the cavity and may cause poor utilization of wear parts.

2. Check the feed arrangement

• In order to reach optimum capacity and maximize on the life of the wear parts, the crusher cavity should be full.

• The feed must be distributed evenly across the crushing chamber.

3. Apply proper scalping

• Fines (material smaller then CSS) should be removed from the feed material. This is done by the grizzly bar section of the feeder. Fines in the jaw crusher increase the percentage of contact area against the jaw dies. This increases scratching and grinding and reduces lifetime.

4. Choose the correct jaw dies for the application

5. Check the wear profile of the jaws

• An uneven wear profile will decrease capacity, increase wear, and increase crushing forces.

Note: Feed material characteristics such as gradation, bulk density, moisture, clay content and crushability have significant impact on crusher capacity.


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C jaw crusher wear parts

Due to the wide range of applications and feed material, many types of jaws are available for the C jaw crushers. Below you will find features and basic recommendations for selecting the wear parts.

	Standard		Super grip	Quarry		Superteeth	Quarry thick		Quarry + super grip		Quarry thick + super grip		Anti-slab	Recycling	Wavy like
	XT610	XT710	XT710	XT710	XT810	XT710	XT710	XT810	XT710	XT810	XT710	XT810	XT710	XT610/ 710	XT610/ 710
Blasted rock															
Difficult and abrasive		●	●	●●●	●●●	●●	●●●	●●●	●●●	●●●	●●●	●●●			
Difficult and non abrasive	●●	●●●	●●●	●●	●●	●●	●●	●●	●●●	●●	●●●	●●			
Medium and abrasive		●●	●●	●●●	●●●	●●	●●●	●●●	●●●	●●●	●●●	●●●			
Medium and non abrasive	●●	●●●	●●●	●●●	●●	●●	●●●	●●	●●	●●	●●●				
Easy and abrasive	●	●●	●●	●●●	●	●●	●●●	●	●●		●●				
Easy and non abrasive	●●●	●●●	●●●	●●●		●●	●●●		●●		●●				
Slabby soft rock	●●	●●	●●	●					●●				●●●		
Gravel															
Abrasive		●●	●●			●●●									
Non abrasive	●●●	●●●	●●●			●●									
Slippery/ round rock															
Abrasive		●●	●●	●		●●			●●●	●●●	●●●	●●●			
Non abrasive	●●●	●●●	●●●	●		●●			●●●						
Asphalt recycling															●●●
Concrete recycling	●●	●●	●●											●●●	
Demolition waste recycling	●●	●●	●●											●●●	

● *Can be used* ●● *Good choice* ●●● *Recommended*

Definitions for different rock types are presented in Wear and materials application guide, page 4.

EXISTING PROFILES*	Standard		Super grip	Quarry		Superteeth	Quarry thick		Quarry + super grip		Quarry thick + super grip		Anti-slab	Recycling	Wavy like
	XT610	XT710	XT710	XT710	XT810	XT710	XT710	XT810	XT710	XT810	XT710	XT810	XT710	XT610/ 710	XT610/ 710
C63		■												■	■
C80	■	■		■										■	■
C100		■		■		■								■	
C96	■		■	■										■	
C105	■			■										■	■
C106	■			■										■	
C116	■			■	■									■	
C3054		■		■		■									
C3055				■		■									
C110		■		■		■	■		■		■		■		
C120			■	■		■			■		■				
C125		■		■	■	■	■	■	■		■		■		
C140				■	■	■	■	■	■	■	■	■	■		
C145				■	■	■	■		■	■	■		■		
C160				■		■	■	■	■	■	■	■	■		
C200				■			■		■		■		■		

** More cavities under development, ask for tailored solution options from your local Metso representative.*

Standard (XT710)
- Good in gravel and non abrasive rock
- Tooth spacing ideal for fines removal
- Power requirement and crushing stresses are in balance
- Less slabby product
- Reduced lifetime in abrasive application

Super grip (XT710)
- Good in gravel and non abrasive rock
- Tooth spacing ideal for fines removal
- Power requirement and crushing stresses are in balance
- Less slabby product
- Reduced lifetime in abrasive application

Quarry (XT710, XT810)
- Good in abrasive and/ or blasted rock
- Flat tooth profile maximizes lifetime (more surface area to crush with)
- More wearable Mn-steel than in standard jaws
- Higher stresses and power requirements
- Less space for fines to pass through (fines removal from feed material is important)
- Increase in slabby product

Superteeth (XT710)
- General use in gravel and blasted rock
- Tooth spacing ideal for fines removal
- More tooth contact surface area compared to standard profile
- More wearable Mn-steel than in standard jaws
- Power requirement and crushing stresses are in balance
- Less slabby product

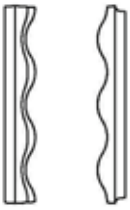
Quarry thick (XT710, XT810)
- Good in abrasive and/or blasted rock
- Fixed jaw die is 40 mm thicker than quarry jaw die (provides longer lifetime)
- Flat tooth profile maximizes lifetime (more surface area to crush with)
- More wearable Mn-steel than in standard jaws
- Higher stresses and power requirements
- Less space for fines to pass through (fines removal from feed material is important)
- Increase in slabby product

Quarry + Super grip (XT710, XT810)
- Good in blasted rock, difficult natural rock and slippery rock
- Sharp tooth profile (good grip on the rock)
- Power requirement and crushing stresses are in balance
- Tooth spacing ideal for fines removal
- Can be used when scalping is not efficient
- Less slabby product

Quarry thick + Super grip (XT710, XT810)
- Good in blasted rock, difficult natural rock and slippery rock
- Sharp tooth profile (good grip on the rock)
- Power requirement and crushing stresses are in balance
- Tooth spacing ideal for fines removal
- Can be used when scalping is not efficient
- Less slabby product

Anti-slab (XT710)
- Uneven tooth height (reduces slabs in feed material)
- Less slabby product

Recycling (XT710)
- Ideal for concrete, brick etc., demolition waste
- Wear and crushing forces in good balance
- Tooth spacing ideal for fines removal



Wavy like (XT710)
- Suitable for asphalt crushing
- Wide grooves (material flows easily through the cavity)

One or two piece jaw

Large C jaws (C110 and bigger) were originally designed to use a 2 piece jaw die design, while the smaller jaw crushers used a 1 piece jaw die design. A 1 piece jaw design is now also designed for large crushers (C110, C120, C125, C140, and C160).

Note: New lifting tool is required for 1 piece jaws. Please contact your local Metso representative.

Benefits of 1 piece jaw die design

- Faster jaw die replacement - less downtime
- Fewer parts - center wedges not required
- Easy to install - suitable for limited maintenance space, mobile applications

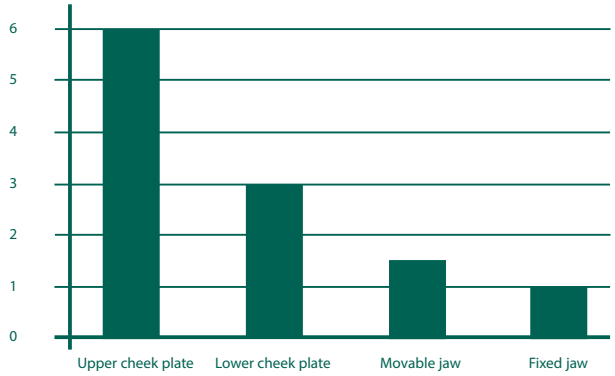
Benefits of 2 piece jaw die design

- Longer lifetime expectation (when changed as recommended)
- Reduced scrap rate and cost/ ton
- Standard lifting tool supplied with the crusher
- Good nip angle if jaws are rotated according to recommendations

EXISTING PROFILES*	Standard	Super grip	Quarry		Superteeth	Quarry thick	Quarry + super grip
	XT710	XT710	XT710	XT810	XT710	XT710	XT710
C110	■		■	■	■		■
C120		■	■		■	■	■
C125			■	■			
C140			■				
C160			■	■	■		■

**More cavities under development.*

Indicative lifetimes of the wear parts. Usually the fixed jaw wears the fastest.



When to change jaw dies

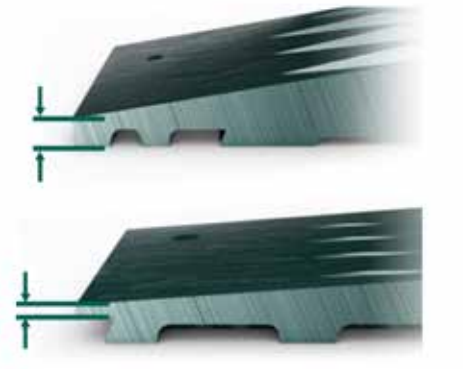
Change the jaw dies before they are worn through, in order to avoid damage to the crusher components (See instruction manual).

In crushers like C105 and C3055, the jaw die design on the ends is different. The locking wedges on these crushers are located behind the jaw dies rather than at the top of the jaw die. Jaw dies can be allowed to wear until the thickness is 60 to 65 mm thick, or the teeth are worn flat.

On other crushers the ends of the jaw dies are much thinner. The wedge retention design where the locking wedges make contact is much thinner. This allows for the ends of the jaw die thickness to wear to 20 to 25 mm, or when the corrugations are worn flat.

Jaw dies may need to be changed earlier than anticipated, if wear profile is distorted.

On single toggle jaw crushers, the fixed jaw die may wear at a faster rate. The table below shows the indicative lifetime of the wear components.



How to change jaw dies

Two piece jaw die rotation and replacement

- Worn out jaw dies are removed from the bottom of the crushing chamber.
- Work hardened upper jaw dies are installed at the bottom of the crushing chamber.
- New jaw dies are installed at the top of the crushing chamber.

This procedure will allow for good work hardening of the manganese jaw dies, and maintain the best nip angle for maximum through put.

One piece jaw die rotation and replacement

- After a new jaw die installation, rotate the single piece jaw dies when 30% of the tooth profile is worn.
- Rotate a second time when the tooth profile at the bottom of the jaw die is completely worn.

This procedure will allow for good work hardening of the manganese jaw dies, and maintain the best nip angle for maximum through put.

Note: Cupping may occur in the joint of movable jaws if the movable jaw is rotated when it is installed in the lower position. This may decrease the crusher's capacity and increase wearing on the fixed side.

Complementary products

Intermediate plate

An intermediate plate can be used when feed capacity is low (empty cavity), feed size is small or feed is slippery.

• Increases length of crushing area in case of empty cavity or small feed size -- better wear profile and longer lifetime

• Improves nip angle providing better grip of material in case the feed material is slippery

• Restrictions are decreased feed opening and maximum setting. These are reduced by the thickness of the intermediate plate. Crushing forces can be higher when using an intermediate plate.

Protection plate for pitman and front casting

Protection plates protect surfaces between the jaw dies onthe pitman and front-end casting, especially when the material hardness and toughness is a concern, or when crushing at the minimum setting.

Protection plates are suitable for all applications and are delivered as standard equipment on large C jaw crushers (except for C125). Protection plates can also be purchased for other size crushers as an option.

Fatboy cheek plates

New cheek plate design with new material (high alloy austenite). Based on the field tests on abrasive applications, gives 1,5 – 2,5 times more lifetime compared to standard AR cheek plate. Therefore reduces maintenance cost and time

Lifting tools

When the jaw die is being lifted, we want to make sure the lift is done correctly and safely. Metso supplies jaw plate lifting tool with the tool kit. The jaw plate lifting tool has a locking mechanism that secures the tool to the jaw plate. Each end of the jaw plate has two lifting holes that the tool is inserted in, and locked. Because the jaw die lifting holes are in as cast condition, a tolerance is applied to these holes. As long as the lifting hole is within the drawing tolerance, the lifting tool will properly engage and lock securely.

Because health and safety of people operating and servicing equipment manufactured by Metso is really important, we request people to pay special attention to safe lifting. Once the lifting tool is inserted into the holes and locked properly and before the jaw plate is lifted, the tool should be moved back and forth to make sure it remains fully engaged, and does not show any sign of slipping out from the lifting hole.

Health and Safety is an important issue and a high priority for Metso. The jaw plate hole inspection gage was initially designed for Metso internal quality assurance purposes to check the lifting holes for the correct dimensional size. These gages are available, and can also be purchased by Metso dealers, distributors and customers. The Technical Data Sheet below identifies the gages by the part number. The part number reflects what crusher size the gage is for. The gage is designed to check if the lifting hole is not according to the specification, for example: too small, too big or out of the required shape. The instructions on how to use the gage are shown on the Technical Data Sheet.

Note: Cupping may occur in the joint of mo

Intermediate plate

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Expect results

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