

Sandvik 700 range horizontal shaft

Impact crushers (HSI)

Gets the job done - both of them

The all-new 700 range of Horizontal Shaft impact crushers offers new levels of safety and efficiency.

Developed to comply with new EU legislation, you can configure these smart, modular crushers to operate in a variety of applications in either primary or secondary crushing mode.

The result is higher uptime, and lower cost of ownership from proven crushers that add even better performance and cost savings than before.

The crushers come with a host of innovations for greater safety and efficiency including the patented rotor locking and positioning device to ensure no hands need be placed on the rotor during maintenance. The locking feature locks the rotor in position before the crusher pivot is opened in the event of a blockage. The hammer position indicator shows hammer positions in the crusher before the crusher pivot frame is opened.

Built using a modular system, the new impact crushers can be ordered and shipped very fast. And changed even faster — in less than a day if you need to change duties from primary to secondary crushing.

When handling soft to medium soft material, the Sandvik HSI series give outstanding result as 1st or 2nd stage.

The Sandvik HSI crusher is known for being easy to work with. Low downtime due to clever solutions when handling the hammers for turning them or replacing the hammers for new ones.

The latest generation comes with improved drive guards allowing v-belt tension without disassembling of the guards and therefore saving of maintenance downtime.

Key features

- High reduction ratios
- Reduced power consumption
- Easier and safer maintenance
- Range of wear parts to ensure optimum operating costs
- Designed for quarries and recycling industries
- Good product shape — low flake and elongation ratios
- Ability to handle re-enforced steel bars enabling recycling of both steel and aggregate
- Ability to recycle old road surfacings (asphalt) for inclusion in new asphalt products



Feed size

Technical data on next pages specify maximum feed size for the Sandvik primary and secondary impact crushers. These are recommended values for a smooth and continuous operation of the crushers. Blasted feed homogeneity is also an important criteria for primary impact crushers.

In primary impact crushing process, the physical size of the crusher feed opening must not be considered as the true gauge to set the maximum crusher feed size and - as a result of that - assess that any lump passing through the crusher feed opening has the correct feed size. Significantly larger feed opening than recommended feed top size is recommended to ease material flow and decreases bridging risks when several big lumps come at once.

Table below recalls the relationship between lumps sizes and their approximated masses for material specific gravity of 2.65 g/cm³. Small variation in lump size implies important variation in its mass and the relevant impact energy to the rotor. This must be kept in mind when evaluating applications in primary crushing circuit.

Mass (kg)	Dimension sphere (mm)	Dimension cube (mm)
200	525	425
760	820	660
1 000	900	720
1 500	1 020	830
2 000	1 130	910
2 500	1 220	980
3000	1 290	1 040

Feed principle

The right feeding principle of impact crushers is basically a regulated feed process. Choke feeding of an impact crusher must not be done as it would create high wear and damages to the equipment. Removal of fines ahead of an impact crusher is the normal process. Fines in the feed creates additional wear (if material is abrasive), rises risk of clogging if material is sticky and/or will generate additional dust emission. It may also require a larger crusher to achieve the same total production.

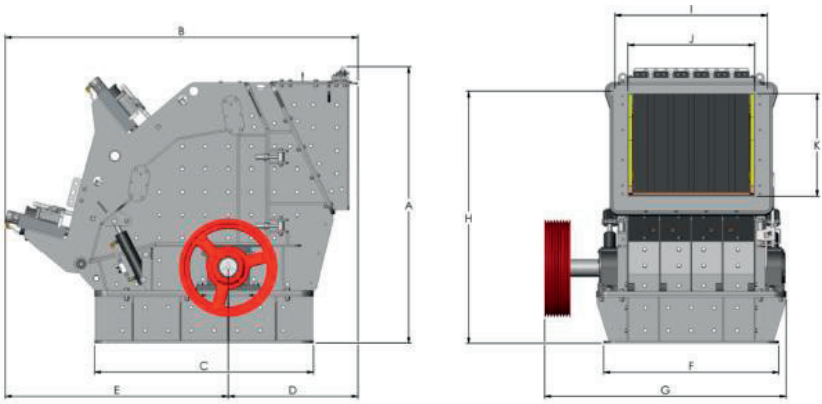
Feed set-up

Impact crushers must always be fed on all width of the machine (80 to 90%) to ensure an even wear of the hammers. Concentrated feed will generate localised wear at hammer centre, when material stream is not correctly spread across by the crusher feed chute. Typical case of wrong feed method is a direct material flow penetrating straight into the crushing chamber from a belt conveyor.

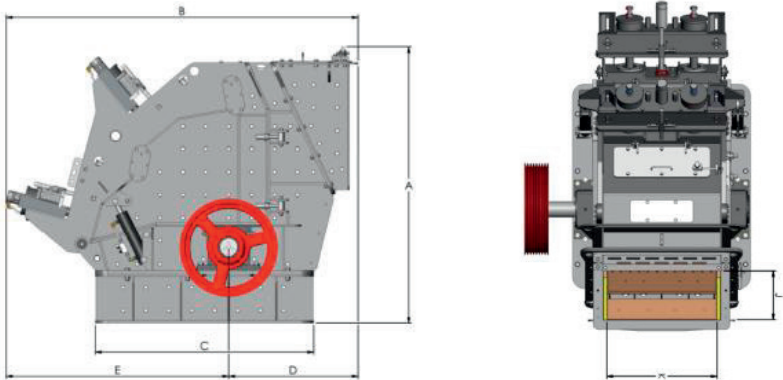
Product discharge

Crushed product has a high velocity when leaving the crushing chamber. Special care must be given to the design of the transfer point underneath the crusher, to prevent damages on collecting belt conveyor/vibrating feeder and to prevent excessive wear: stone box, thick chute liners wherever needed (20 to 30 mm AR steel 400 HB), sufficient headroom underneath the crusher.

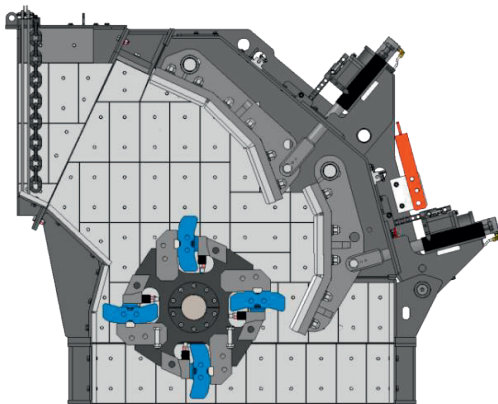
Dimensions mm (in)	CI711 primary	CI721 primary	CI731 primary
A	2,293 (90 1/4")	2,514 (99")	2,840 (111 13/16")
B	2,836 (111 5/8")	3,118 (122 3/4")	4,070 (160 1/4")
C	1,810 (71 1/4")	2,200 (86 5/8")	2,630 (103 1/2")
D	1,081 (42 9/16")	1,189 (46 13/16")	1,980 (77 15/16")
E	1,844 (72 5/8")	1,930 (76")	2,090 (82 5/16")
F	1,452 (57 1/8")	1,900 (74 13/16")	2,565 (101")
G	2,003 (78 7/8")	2,370 (93 1/4")	3,224 (126 15/16")
H	2,096 (82 1/2")	2,317 (91 1/4")	2,840 (111 13/16")
I	1,264 (49 3/4")	1,664 (65 1/2")	2,165 (85 1/4")
J	980 (38 9/16")	1,360 (53 1/2")	1,935 (76 3/16")
K	850 (33 7/16")	1,000 (39 3/8")	1,395 (54 15/16")
Weight kg (lbs)	11,184 (24,656)	16,256 (35,838)	29,650 (65,367)
Max. Feed Size mm (in)	600 (23 5/8")	900 (35 1/2")	1,000 (39 3/8")
Rotor Diameter mm (in)	1,005 (39 1/2")	1,150 (45 1/4")	1,390 (54 3/4")
Rotor Width mm (in)	950 (37 3/8")	1,330 (52 3/8")	1,900 (74 13/16")



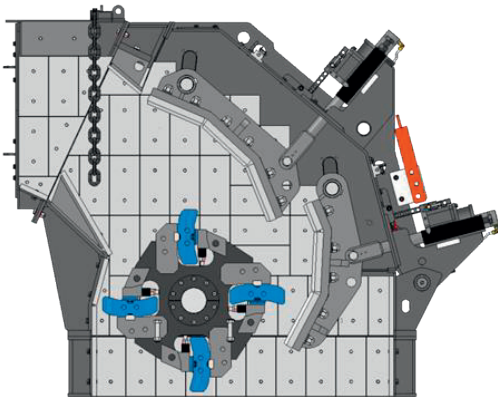
Dimensions mm (in)	CI712 secondary	CI722 secondary	CI732 secondary
A	2,293 (90 1/4")	2,514 (99")	2,840 (111 13/16")
B	2,836 (111 5/8")	3,118 (122 3/4")	4,070 (160 1/4")
C	1,810 (71 1/4")	2,200 (86 5/8")	2,630 (103 1/2")
D	1,081 (42 9/16")	1,189 (46 13/16")	1,980 (77 15/16")
E	1,844 (72 5/8")	1,930 (76")	2,090 (82 5/16")
F	1,452 (57 1/8")	1,900 (74 13/16")	2,565 (101")
G	2,003 (78 7/8")	2,370 (93 1/4")	3,224 (126 15/16")
H	2,096 (82 1/2")	2,317 (91 1/4")	2,840 (111 13/16")
I	1,264 (49 3/4")	1,664 (65 1/2")	2,165 (85 1/4")
J	434 (17 1/16")	436 (17 3/8")	600 (23 5/8")
K	980 (38 9/16")	1,360 (53 1/2")	1,935 (76 3/16")
Weight kg (lbs)	11,184 (24,656)	16,256 (35,838)	29,650 (65,367)
Max. Feed Size mm (in)	300 (11 7/8")	350 (13 3/4")	350 (13 3/4")
Rotor Diameter mm (in)	1,005 (39 1/2")	1,150 (45 1/4")	1,390 (54 3/4")
Rotor Width mm (in)	950 (37 3/8")	1,330 (52 3/8")	1,900 (74 13/16")



		CI711 primary	CI721 primary	CI731 primary
Rotor diameter	mm	1,005	1,150	1,390
	in	39 1/2"	45 1/4"	54 3/4"
Motor (min/max)	Min (kW)	90	185	220
	Max (kW)	185	250	440
	Min (HP)	125	248	295
	Max (HP)	250	335	590
No. of hammer rows		4	4	5
No. of hammer bars per row		1	1	3
Rotor Speed Range	rpm	555 to 656		398 to 445
Max feed size G	mm	600	900	1000
	in	24"	36"	39 3/8"
Total weight (2 curtains)	kg	11,005	16,000	27,750
	lb	24,262	35,274	61,178
Rotor & shaft assembly with hammers, bearings & sheave	kg	3,060	4,890	11,200
	lb	6,746	10,781	24,692



		CI712 secondary	CI722 secondary	CI732 secondary
Rotor diameter	mm	1,005	1,150	1,390
	in	39 1/2"	45 1/4"	54 3/4"
Motor (min/max)	Min (kW)	90	185	220
	Max (kW)	185	250	440
	Min (HP)	125	248	295
	Max (HP)	250	335	590
No. of hammer rows		4	4	5
No. of hammer bars per row		1	1	3
Rotor Speed Range	rpm	656 to 740	656 to 740	656 to 740
Max feed size G	mm	300	350	350
	in	11 7/8"	13 3/4"	13 3/4"
Total weight (2 curtains)	kg	11,184	16,256	29,650
	lb	24,656	35,838	65,367
Rotor & shaft assembly with hammers, bearings & sheave	kg	3,004	4,824	11,200
	lb	6,623	10,635	24,692



Tonnages vs settings (CSS)

		Settings, mm (inch)			
Primary		30 (1 3/16")	50 (2")	100 (3 15/16")	200 (7 7/8")
	Max feed Size	Throughput mtph (stph)			
CI711	600 (23 5/8")	-110 (- 120)	-130 (-150)	-200 (- 220)	-
CI721	900 (35 7/16")	-220 (-240)	- 275 (-300)	- 400 (- 440)	-
CI731	1000 (39 3/8")	-310 (-340)	- 375 (-430)	- 500 (-570)	- 700 (-770)

		Settings, mm (inch)			
Secondary		10 (3/8")	20 (3/4")	50 (2")	
	Max feed Size	Throughput mtph (stph)			
CI712	300 (11 7/8")	-90 (-100)	-150 (- 165)	-	
CI722	350 (13 3/4")	- 150 (-170)	- 250 (- 275)	-	
CI732	350 (13 3/4")	- 200 (-225)	- 375 (-400)	- 570 (-625)	

- Note!
- For Prisec 3 the standard 315 kW motor will not be enough for some of these figures. Optional 2 x 220 kw motors might be required to reach figures shown above.
 - The throughput figures will vary with bulk densities of the material being crushed.
 - CSS settings are examples. The CSS can be sett in between these measurements

Operating parameters

		Rotor tip speed alternatives, m/s			
		Standard (low) 50 Hz	Option (high) 50 Hz	Standard (low) 60 Hz	option (high) 60 Hz
CI711	29	34	31	35	
CI721	34	39	35	38	
CI731	33	40	35	40	
CI712	40	45	40	44	
CI722	31	35	29	32	
CI732	35	41	32	36	

- Note!
- Standard tip speed is most efficient (cost per ton) in most cases. Please consult Sandvik expertise for advice on rotor tip speed.

Feed material limitations

Since the crushing method is impact crushing, there are limitations in the characteristics for the feed material. If the material is to tough, the hammer and liner wear might be excessive and liners might fail on a regular basis. There are alternatives for hammers and liners that might suit the specific application. If Yellow warning, please consult Sandvik expertise.

Work Index

- WI up to 18 - OK for HSI crushers
- WI >18 - 20 - Harder than recommended but will work with low tonnage and low Ai
- WI >20 - Warning. Check with Sandvik expertise

Abrasion Index

- AI < 0.25 - OK for HSI crushers
- AI 0.25 - 0.3 - Harder than recommended but will work with low tonnage and low Ai
- AI > 0.3 - Warning. Check with Sandvik expertise

Density

- If the density of the material is too low the crushing force will not be sufficient. Please consult Sandvik expetise if the material to be crushed is not stone and the density is very low.

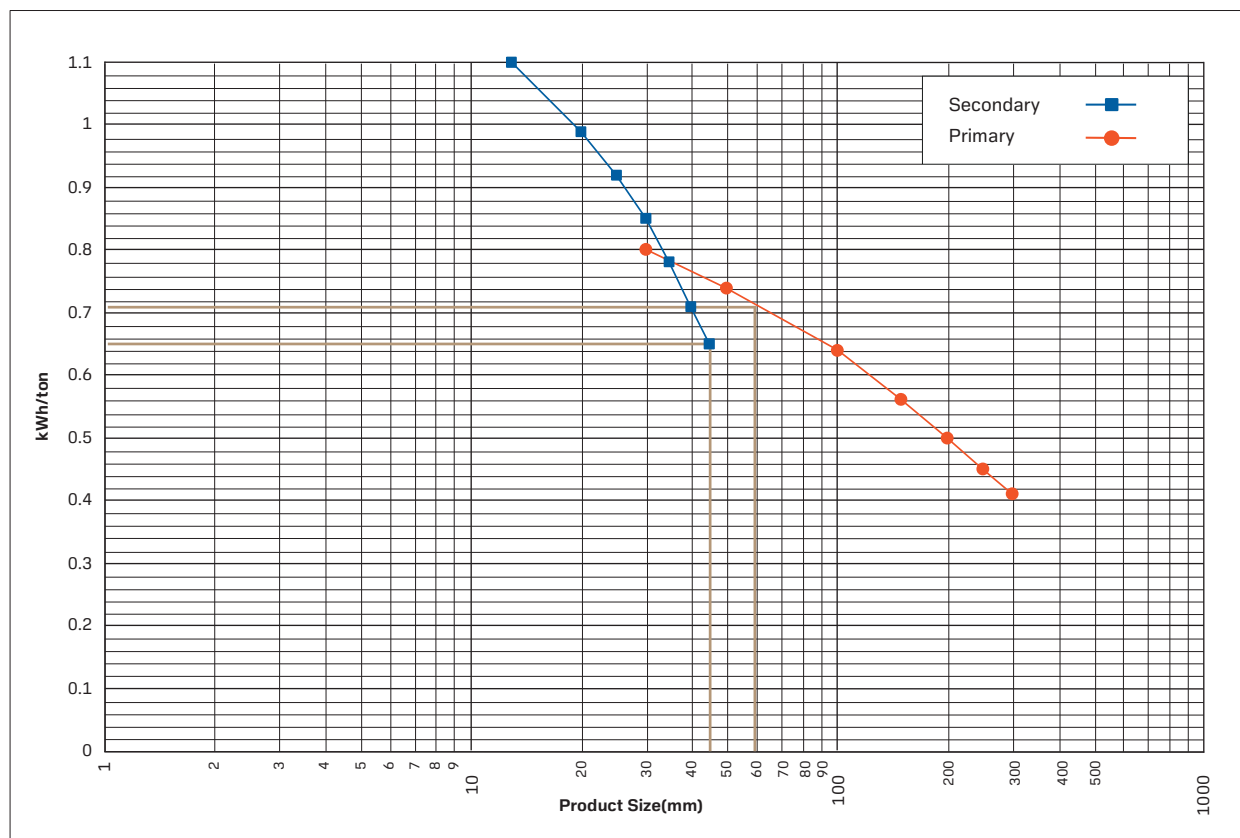
Motor characteristics

Model	CI711	CI712	CI721	CI722	CI731	CI732
Manufacturer	ABB					
Type	Squirrel cage Induction motor according to IE3 / IE4 or corresponding level depending on area					
Rated power in standard scope	185 kW	185 kW	250 kW	250 kW	315 kW	315 kW
Frequency	50/60 Hz					
Poles	4 poles for 50 Hz, 6 poles for 60 Hz					
Insulation class	F	F	F	F	F	F
Protection class	IP55	IP55	IP55	IP55	IP55	IP55
Max allowed power	185 kW	185 kW	250 kW	250 kW	2 x 220 kW	2 x 220 kW

Note! Prisec 3 has a motor alternative with dual drive in total 440 kw.

Required motor power

- * The required power can be approximated if the desired product size is known.
(P80 for primary and P90 for secondary crushers)
- * Required power = Specific Energy x Total Throughput
- * Where the Specific Energy is read from the following chart:



Example

Fresh Feed tonnage is 300 t/h. It is a primary Impact Crusher running in open circuit, producing a crushed fraction with P80% = 100 mm.

Production minus 100 mm is 240 MTPH.

The total throughput is 300 MTPH. Then the specific energy is: Specific Energy = 0.64 kWh/ton, see graph.

Therefore the Required Power of the Impact Crusher will be:

Required Power = Specific Energy x Total Throughput = 0.64 x 300 = 192 kW

Curtain settings

The principle of the Sandvik HSI crushing chamber is controlled by the 2 curtains that can be adjusted to work in the most efficient way in the specific application. There are certain principles of the 2 curtain settings and to get the most out of your Sandvik HSI crusher, you should consult Sandvik for the best result. The second curtain is controlling the product size required but the first curtain is equally important to get the most out of the crusher. In the chart below you see the range of settings.

Crusher	Model	1st curtain mm	2nd curtain mm
Primary	CI711	142-283	30-177
	CI721	188-350	30-200
	CI731	200-350	30-200
Secondary	CI712	63-265	10-120
	CI722	54-300	10-200
	CI732	85-225	10-200

Standard scope of crusher

Impact Crusher HSI	<ul style="list-style-type: none"> — Inlet for Secondary or Primary crushing fitted depending on model selected
Rotor arrangement	<ul style="list-style-type: none"> — Complete rotor with hammers — Standard hammers in Chrome Steel — Integrated Rotor locking and hammer positioning device
Frame arrangement	<ul style="list-style-type: none"> — Crusher with fixed and pivot frame is mounted on support frame — Drive shaft left hand side of the machine viewed from feed opening — Bearing Temperature Sensor fitted to both bearing houses — Hydraulic frame opening — Curtain Liners in Chrome steel — Base Liners in Chrome Iron
Setting adjustment	<ul style="list-style-type: none"> — Semi-Automatic Curtain adjustment system — Hydraulic curtain adjustment
Drive	<ul style="list-style-type: none"> — Drive kit with standard speed consisting of motor pulley(s), V-belts and bushing — Electrical 4 pole (50 Hz) or 6 pole (60 Hz) multi voltage motor — Degree of protection IP55, efficiency class IE3 or corresponding level depending on area — PT100 sensors fitted on winding — Motor Brand ABB — Drive guard — Motor mounting assembly
Interlock kit	<ul style="list-style-type: none"> — Safety Interlock Kit for safe opening of frame and inspection door — Unique key access to each individual crusher(s)
Miscellaneous	<ul style="list-style-type: none"> — Electrically operated hydraulic power pack for curtain adjustment and frame opening — Tools and handling bar for hammers — Painting Sandvik Grey and Sandvik Orange — 1 set of paper manuals and 1 USB stick with manuals (SPC and WPC only in english) — Freight according to Incoterms 2010, CIP Named Destination (road/rail transport) or DAP Port of Destination (sea transport)

Options

Hammer options

Consult Sandvik expertise for best selection.

- Ceramic Chrome Steel Hammers. For Primary and Secondary
 - Suitable for more demanding application and medium abrasive material.
 - Chrome Iron Hammer. For Secondary applications only
 - Suitable for more demanding applications with medium abrasive material.
- This hammer is harder than the other options so life time is longer, but the hammer is also more brittle which means it cannot take big feed size

Electrical control panel

This control panel has been specifically designed for use with the VSI crushers. The control panel ensures correct starting and operation. the following features are included:

- Hours run meter
- Molded case circuit breakers
- Anti Condensation Heater (A.C.H)
- Terminals for remote control
- Pre-Start alarm that sounds in 15 seconds before the crush starts
- Motor load

Lifting jibb

- Complete lifting jib with chain block and wheeled trolley
- Makes the handling of the hammers to be swift and efficient to lower the downtime

Alternative rotor tip speed

- High rotor tip speed for higher reduction. Consult Sandvik expertise for advice

Alternative motor power

- Dual drive 2 x 220 kw with drive guard and motor mount assembly. Only available for CI731 and CI732

Primary crusher returns feed chute

- Returns feed chute options fit the top of the existing standard feed hopper and feeds the re-circulated material on top of the incoming primary feed material

Digital standard Sandvik MDR

- MDR, Material Data Record, to be sent to customer if selected

Wear parts

Wear parts

Sandvik develop new and alternative wear parts continuously to be used in different applications with different level of demanding feed material. This is to extend the life time and reduce downtime. Consult Sandvik for more information on how to optimize your HSI crusher.

Applications

Example of applications where Sandvik HSI crushers are used

- For most applications where the feed material is low to medium abrasive
- Recycling of reinforced construction material with metal bars
- Coal applications
- Recycle old road surfacing (asphalt) for inclusion in new asphalt products
- Applications where low flakiness and elongation ratios are needed



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