

TECHNICAL CIRCULAR

DOC No.: HHI-TEC-0457

Date : OCT 14, 2022

**SUBJECT: STANDARD TOOL OF EXHAUST VALVE GRINDING
MACHINE FOR EXHAUST VALVE SPINDLE AND SEAT
ON NEW MAN-ES ENGINES**

TYPE: ALL HYUNDAI-MAN B&W 2-STROKE ENGINES

DISTRIBUTION

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The exhaust valve grinding machine for exhaust valve spindle and seat has been optional tool on HYUNDAI-MAN B&W 2-Stroke engines by the technical information "HD-B-0066(2004-11-26)" and the MAN-ES' service letter "SL-05-447".

The one of reason was that the W-seat design of exhaust valve bottom piece has an ability to minimize the dent mark size compared to the wide-seat design, and the W-seat also excellent on the ability to crush seat deposits meaning that the W-seat are more forgiving if the seat contact are not kept clean. Furthermore the W-seat has an ability to make firm seat contact on both seats in the contact, even if the seat angle difference between spindle and bottom piece are slightly out of Spec.

However, the W-seat has one major drawback, being that the spindle cooling are diminished due to the minor thermal seat contact, compared to wide-seat.

According to the trend of engine development, the combustion process has developed in a direction that put more and more heat load on the exhaust valve spindle. This development has been forced to re-introduce the wide seat design in order to avoid too short spindle service life due to the disc bottom burn-off. Therefore, it has been specified wide seat bottom piece on newbuilding's within the 50-70 bore segment since the beginning of 2014. Since mid-2016, the wide seat design has been standard on all newbuilding's regardless bore size. The bore cooled wide seat bottom piece and optimized seat angle was introduces primo 2019 in newbuilding's.

The ongoing trend of increased combustion chamber heat load has been forced to prioritize wide-seat design, in order to make sufficient spindle cooling, making the spindle bottom burn-off rate endurable. Also the enhanced cooling with wide seat, will make it possible to keep the spindle seat maximum temperature below a threshold limit.

However, a number of spindles suffering from the blow-by has been seen after having been in service for several years by applying wide seat design. We find that in case the spindle bottom burn-off rate are in the lower range, then the increasing number of dent marks that are accumulated on the seat's during service will most likely be the cause of reduced lifespan if not addressed.

Therefore, the exhaust valve grinding machine for exhaust valve spindle and seat will be introduced as a standard tool for new ordered all Hyundai-MAN B&W 2-Stroke engines since it is worthwhile to carry out seat preventive grinding. Preventive grinding of exhaust valve spindle seat and bottom piece has more advantage compares to the spindle reconditioning. This tool can be provided with extra cost for the ongoing projects, if requested.

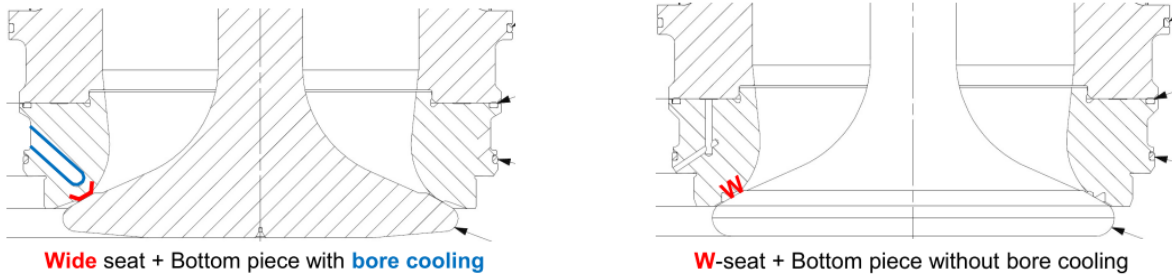


Figure: Exhaust valve bottom piece design

And also, please refer to MAN-ES' service letter regarding the guidance of preventive grinding of the exhaust valve spindle seat and bottom piece for engine with wide seat design in service.

We hope the information will do you a valuable service.

※ Attachment: MAN-ES Service letter SL2022-729/AGC

[The end]

Yours sincerely,

S. H. Shin

S. H. SHIN / Senior Engineer

Head of Marine Engine & Machinery Technical Sales Dep't

Dear Sir or Madam

Exhaust valve spindles with a bottom burn-off rate resulting in a spindle life exceeding 16,000 hrs. or 24,000 hrs., depending on whether the engine bore size is smaller or larger than 60-cm bore, will need preventive spindle seat grinding to mitigate the risk of dent mark formation, eventually resulting in seat blow-by.

Spindle seat overhaul requirement

Piston bore < 60: 16,000 hours ± 2,000 hours
 Piston bore ≥ 60: 24,000 hours ± 3,000 hours

- Grind the spindle seat until the size of the dent mark is smaller than 2 mm in diameter.
- Connecting dent marks must be treated as one mark.
- Grind as little as possible in order to obtain the max. dent mark size of Ø2 mm.
- Start by grinding in steps of up to 0.2 mm in accordance with the grinding machine manual and continue if necessary.
- Preventive grinding should not exceed 0.5 mm depth. If a dent mark exceeds Ø2 mm after 0.5 mm grinding, evaluate according to the guideline attached.
- Maximum seat grinding according to the maintenance manual (today maximum 2 mm seat grinding is allowed on all MAN B&W 30-98 bore engines).

Preventive grinding on wide-seat exhaust valve bottom piece

Simultaneous with the spindle seat overhaul, light grinding (depth 0.1 mm) must be performed on the bottom piece seat. Bottom piece seat grinding angle = 30.0° +0°/- 0.05°.

For questions or a quote on the grinding machine, please contact PrimeServ at: Primeserv-cph@man-es.com

You are welcome to contact your local PrimeServ Service Centre if you prefer MAN Energy Solutions to perform the preventive grinding.

Failure to comply with this guideline may affect the expected valve spindle service life.

Yours faithfully



Mikael C Jensen
 Vice president Engineering



Stig B Jakobsen
 Senior manager

Action code: AT FIRST OPPORTUNITY

Preventive grinding of exhaust valve seats

SL2022-729/AGC
 September 2022

Concerns

Owners and operators of MAN B&W two-stroke marine combustion engines. Type: All 30-98 bore engines with exhaust valve seats of the wide seat type.

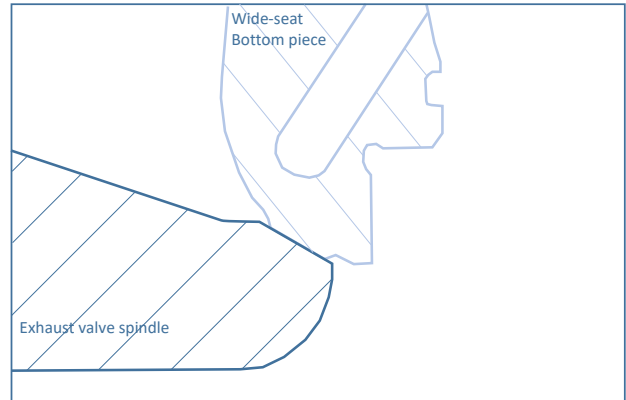
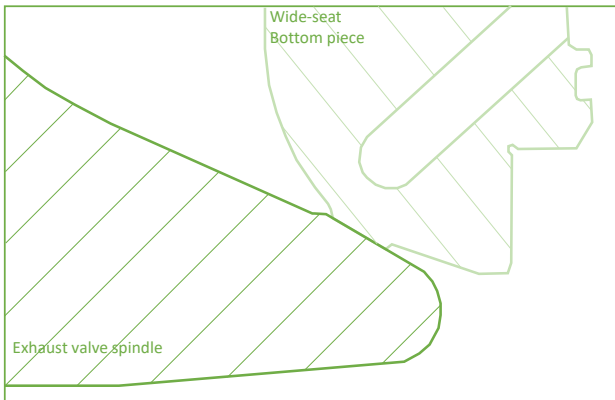
Summary

Preventive grinding of the exhaust valve spindle seat and bottom piece seat is introduced as a requirement. To allow for the planning of the overhaul work, this takes effect from the date of this service letter plus six months.

References

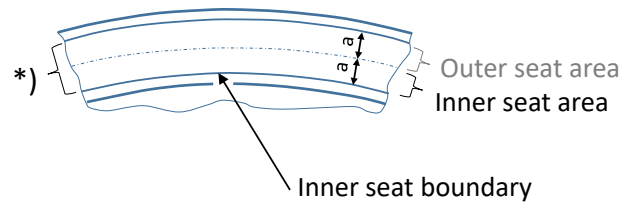
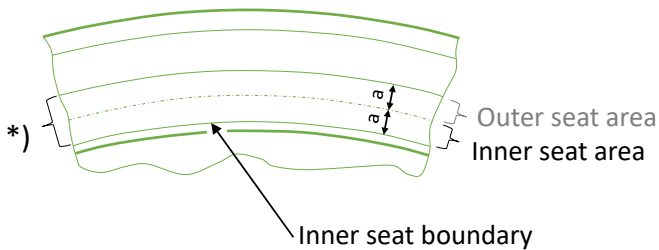
SL2019-682/JAG:
 New recommendation for grinding angle of exhaust valve spindle.
 Grinding angle for spindle seat = 30.2° +0.05°-0°.

In the event of dent marks exceeding $\varnothing 2$ mm after 0.5 mm spindle seat grinding, evaluate according to the sketch below.



Spindle seat seen from top.

***) Seat contact area: spindle seat $><$ bottom piece seat.**



Spindle outer seat area

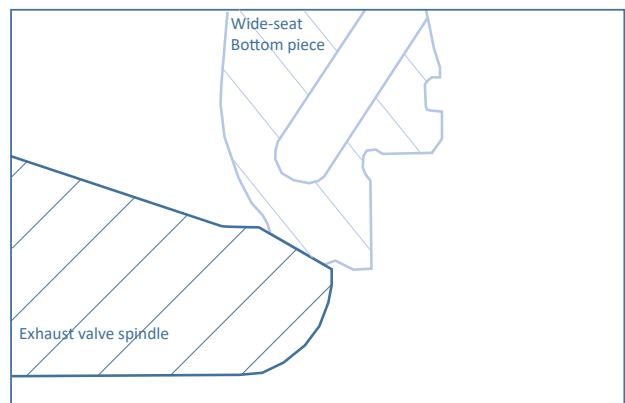
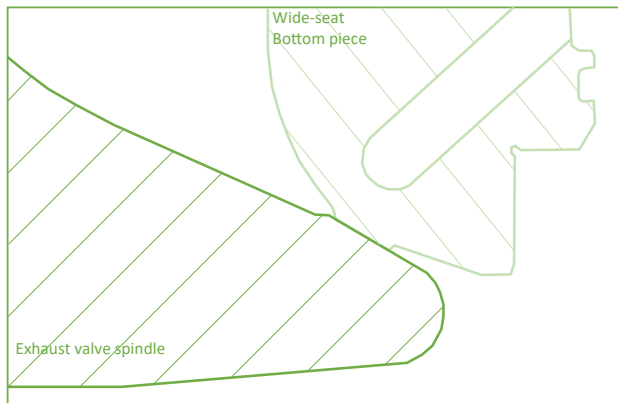
Dent marks exceeding $\varnothing 2$ mm can be allowed, but the size must not exceed 8 mm size in any direction, and the dent mark must not affect the inner seat area.

Spindle inner seat area

Dent marks exceeding $\varnothing 2$ mm cannot be allowed on the inner seat area, except if the following conditions are fulfilled for that particular dent mark:

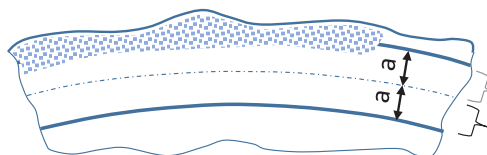
1. Minimum distance from dent mark to inner seat boundary is above 4 mm.
2. No visible sign of V-shaped hot corrosion or “elephant skin” in connection to the dent mark.
3. Largest dimension of dent mark may not exceed 4 mm in any direction.

Defects necessitating rejection or repair.
The sketches below are valid for spindle seats.

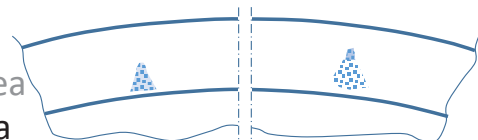


Spindle seat seen from top.

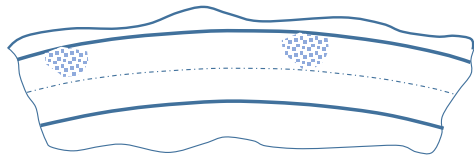
*) Seat contact area: spindle seat >> bottom piece seat.
 All below examples to be rejected for further use.



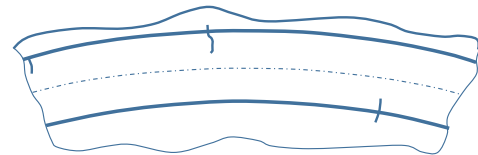
Outer seat area
Inner seat area
 Circumferential hot corrosion width > $0.15 \cdot (2 \cdot a)$
 Where $(2 \cdot a)$ = Seat contact area imprint from bottom piece.



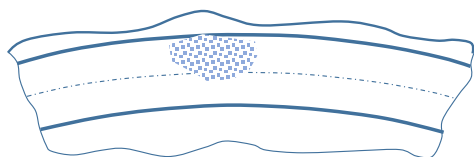
Seat blow-by with V-shaped hot corrosion formed in connection to the blow-by. A single incident is sufficient cause for rejection



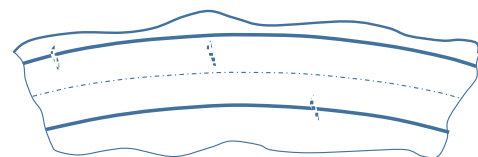
Quantity of local hot corrosions > 2.



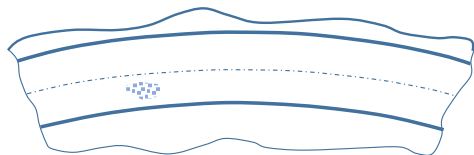
Cracks; Regardless of their position and extent. A single crack is sufficient cause for rejection.



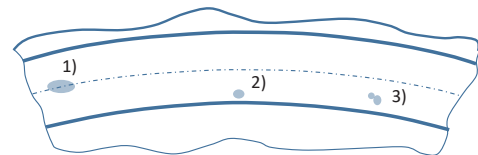
Size of local hot corrosion > half seat length = "a"



"Aligned pin-point porosity" which resembles crack like defects. A single indication of this type is sufficient for rejection.

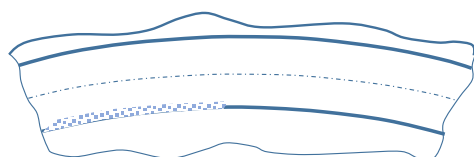


Hot corrosion inner seat area, size > 4mm.



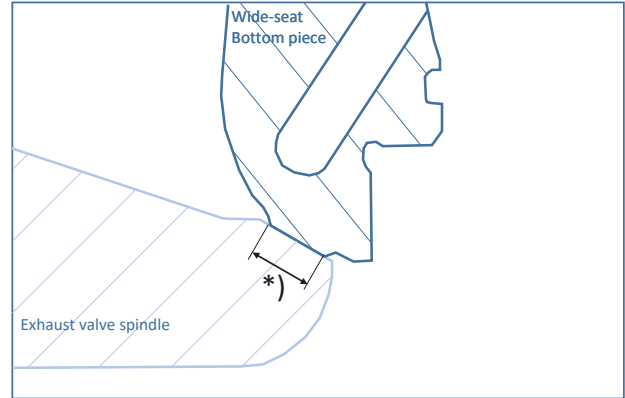
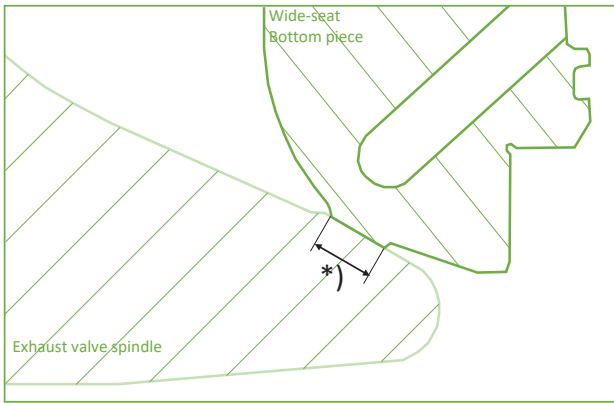
Dentmark on inner seat area

- 1) Size > 2mm in any direction.
- 2) Distance from inner seat boundary less than 4mm.
- 3) Connected small dentmarks considered as one > 4mm in size.

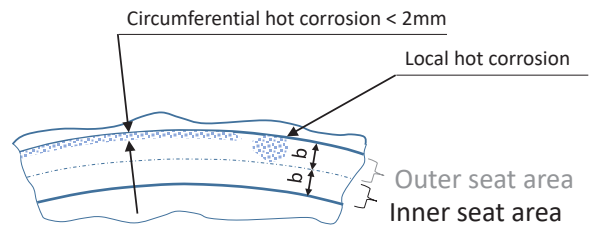
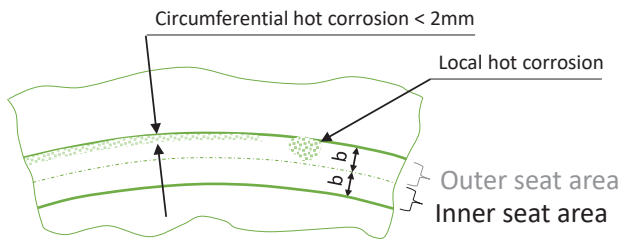


Circumferential hot corrosion on inner seat edge.

Service acceptance criteria for bottom piece seat.



Bottom piece seat seen from below.



Bottom piece outer seat area

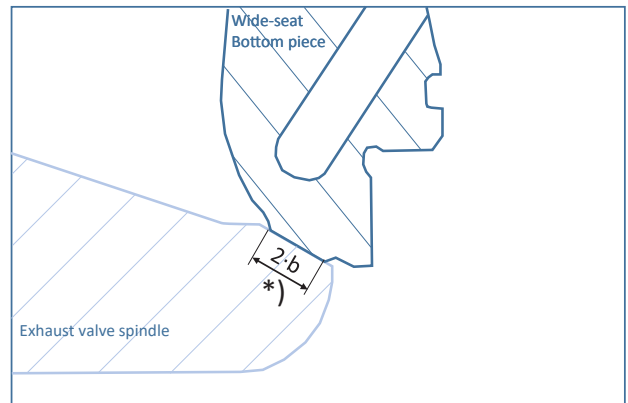
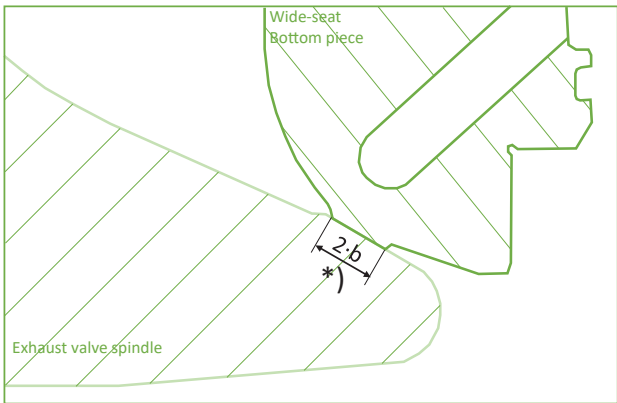
- Hot corrosion at the outer boundary of the bottom piece seat area must not exceed 2 mm width.
- Local hot corrosion on the bottom piece outer seat area, and only affecting the outer seat area, can be accepted if the maximum size in any direction does not exceed half the seat length. Half seat length indicated with “b” in the sketch above. Maximum one local hot corrosion spot of half seat length size can be accepted.
- Dent marks exceeding Ø2 mm can be allowed on the outer seat area provided that the inner seat area is unaffected.

Bottom piece inner seat area

Dent marks exceeding Ø2 mm cannot be allowed on the inner seat area, except if the following conditions are fulfilled for that particular dent mark:

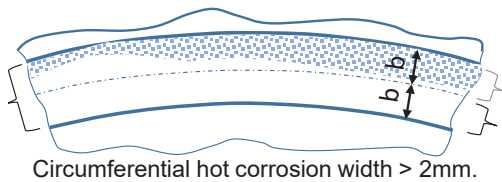
1. Minimum distance from dent mark to inner seat boundary is above 4 mm.
2. Largest dimension of dent mark may not exceed 4 mm in any direction.
3. No visible sign of V-shaped hot corrosion or “elephant skin” in connection to the dent mark.

Defects necessitating rejection or repair.
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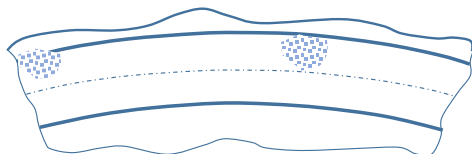
Bottom piece seat seen from below.

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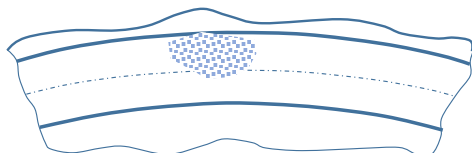


Outer seat area
 Inner seat area

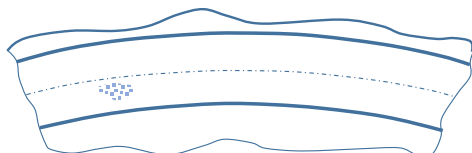
Circumferential hot corrosion width > 2mm.



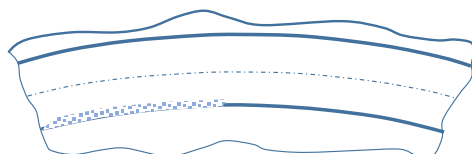
Quantity of local hot corrosions > 2.



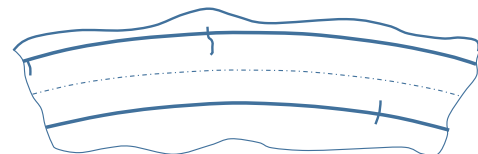
Size of local hot corrosion > half seat length = "b"



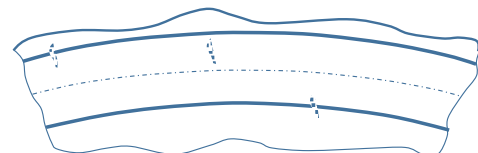
Hot corrosion inner seat area, size > 4mm.



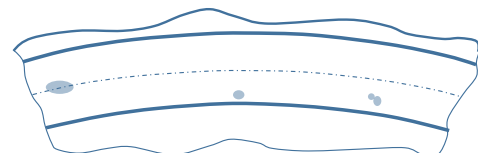
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"Aligned pin-point porosity" which resembles crack like defects. A single indication of this type is sufficient for rejection.



Dentmark on inner seat area

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