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INTRODUCTION

The seating faces of the need to be smooth and flat to make a leak-tight seal. Such sealing faces are necessary on seats and discs and valves fitted with back-seats.
Conventional machining will not produce satisfactorily smooth and flat results.
Lapping produces a uniform, smooth, flat finish and is used both in the process of manufacturing new parts, and as a renovation process on valves that have been in service.

GENERAL

The lapping of the disc and seat should be carried out independently. Avoid lapping of the disc to the valve seat as this tends to create ridges on one of the components and prevents the valve from perfect sealing.

It is bad practice to attempt to lap out deep score marks, where possible these should be machined out prior to lapping. Experience will show whether

the imperfections can be lapped out in, say, ten minutes.
If, however, the damage is more severe than the indication we have given, it is better to skim the faces before lapping takes place, and we would stress the necessity of commencing the lapping on a good machined surface, otherwise, if too much lapping is done, the seat may become convex, and it is impossible to remedy this by continuing lapping.

Proprietary lapping compounds are recommended which will give rapid cutting and a suitable finish from the appropriate grade.

LAPPING PLATE

To carry out lapping on the lines we suggest that some form of lapping plate is necessary to suit the particular design that is being dealt with. We recommend that the lapping equipment is kept specifically for the work for which it is intended to be done.

The surface of the plate has to be machined true and flat and finely grooved to hold the lapping medium.
Cover the surface of the plate with the appropriate lapping compound.
During lapping the whole surface of the plate should be progressively used to keep the whole plate flat.

The preferred abrasive for valve seats will usually be silicon carbide usually be supplied marked coarse, medium or fine. This can be supplied through Weir Valves & Controls UK Ltd.

Silicon Carbide Lapping Compound

Diamond lapping paste can be used when the circumstances dictate e.g. final lap on safety valve discs and seats.

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SMOOTH LAPPING PLATE

A secondary plate can be used as a smooth and final lap, the surface of this plate must also be machined true and flat and finely grooved.
It is recommended this is used only for the final operation only.
During lapping the whole surface of the plate should be progressively used to keep the whole plate flat.

Alternatively, adhesive backed lapping paper may be stuck to the lapping plates. This may be used dry, although some lubricant will be helpful if final polishing operations are required.
Before using any plate ensure they are completely flat.

Self-adhesive silicon carbide paper.

Lapping papers are available in various grades, and as a general guide, at the commencement of a coarse grade would be used progressively and getting finer.

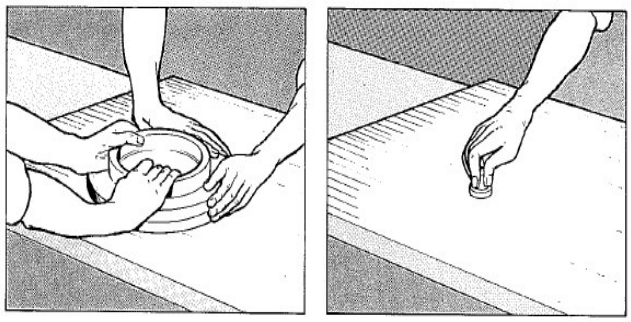
When carrying out any lapping operation always ensure that the coarser grit is properly cleared away when transferring to a finer lapping medium.

PARALLEL SLIDE & UNIFLOW VALVES LAPPING VALVE DISCS

Discs with flat surfaces, such as parallel-slide valves, stop valves, and 'Uniflow' valves are lapped by imparting a semi-rotary movement and also a figure a of 8 motion to the disc, taking care to apply an equal amount downward pressure around the disc, the direction of lapping should be reversed after a few revolutions.

The lapped finish should be of a consistent grey matt appearance, the flatness can be checked using engineers blue on a surface table.

The disc is finished on the smooth lapping plate using fine compound, only slight lapping is required for this operation.
The finish is consistent grey matt appearance, again the flatness can be checked using engineers blue on a surface table.

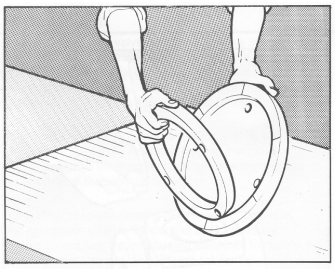


Hand lapping of large and small discs

LAPPING VALVE SEATS

These usually consist of two pieces-

- A cast-iron lapping disc with a dead-flat surface in which a number of slots have been cut.
- A pilot which fits closely into a recess in the lapping plate and is secured by screws.



The pilot is of such diameter as to give enough clearance in the seat bore to allow for a slight eccentricity of motion when rotated on the seat.

The lapping operation is carried out by the semi-rotary movement of the plate on the seat face.

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This motion is produced by using fixing a T bar handle to the lapping plate. Care should be taken to keep the lapped surface flat, to do this it is imperative that the lapping disc be kept perfectly flat. The pilot should be removed and the lapping plate reconditioned on the rough lapping plate after use on each seat.
The surface of the lapping plate should then be carefully cleaned with a soft cloth and the pilot refitted.

Lapping should be carried out in the conventional manner using proprietary lapping pastes. As the lapping continues, abrasive should be thoroughly cleaned away for inspection, then, when appropriate finish lapped with a fine paste. The finished lapped seats will have the same grey matt appearance as the discs.

Seat Lapping Plate showing the pilot plate attached.

Place lapping plate over the valve seat

Lapping of the valve seat using a T bar handle

SAFETY & GLOBE VALVES

Valve seat reconditioning at an early stage is more likely to be necessary in a safety valve than any other pattern. This is probably due to the fact that, in bringing a new boiler into service, there is unfortunately a considerable amount of boiler and pipe scale to be evacuated from the system, and it often happens that some of the scale is trapped between the valve facing and seat, causing leakage.

Should the seats of either safety valves or globe valves need machining before lapping, it is essential that they be skimmed up until all the marks have disappeared, maintaining the same sizes and seat angles as when originally supplied. Any machining must be done so as to keep the seat parallel to the lid flange.

Lapping can then be done with the seat lapping plate, periodically removing the plate and redistributing the lapping compound over the face.

For hard seated safety valves the final width of the seat face should be kept narrow if leakage near the set pressure is to be avoided. Soft seated safety valves have flat seats, and provided the valve head and seat are not seriously scored, moderate lapping will allow the PTFE to seal without having to resort to high quality lapping. Final lapping should be carried out with the plate in good condition, using fine grade lapping compound. The seat flange should now be finished free from all marks, flat and square to the lid flange.

Particular care must be taken to use the lapping abrasive sparingly and to keep the width of the seat face as originally supplied; failing to do so will cause erratic lifting pressure of a safety valve.

The valve may be tested for contact bearing on its seat. First clean off all abrasive and give a smear of engineers blue to the faces. A light turning of the valve on its seat will show the bearing. Valves should be lapped on suitable lapping plates, and never lapped onto the valve seat.

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LAPPING SEATS IN LARGE VALVES

Removal of large valves from the pipeline is costly and time consuming. Lapping of seats in these valves can be carried out by using one of the Valve Lapping Machine that are available, please refer to manufactures guidelines for specific details or contact Weir Valves & Controls UK Ltd.

Air and electrically operated lapping machines specially designed for speedily lapping valve seats in-situ, after removal of the valve lid assembly are available.

Further information on lapping machines and details of other equipment suitable for parallel slide valves are available on request.
Please contact Weir Valves & Controls UK Ltd for further details.

SAFETY

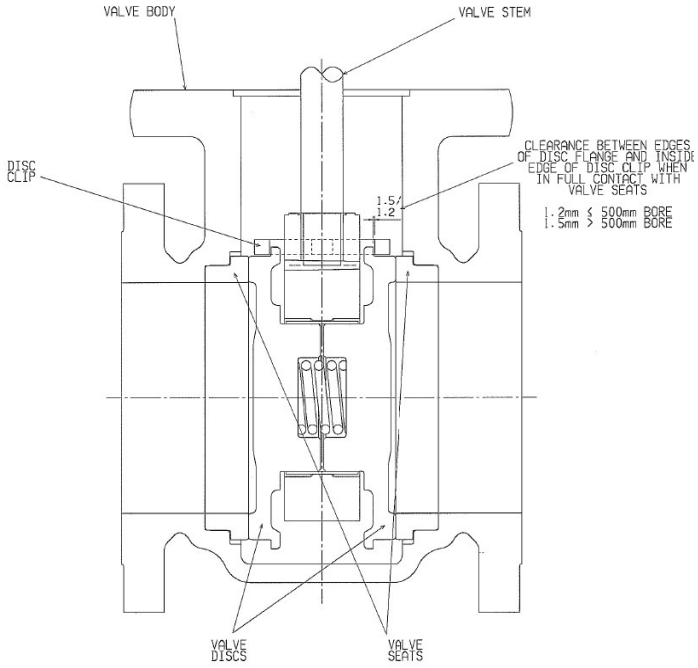
The safe operation of powered lapping equipment is essential. Anyone using lapping machines must be aware of how to stop the equipment, how to prevent injury to themselves, and how to prevent damage to the machine and other components. Equipment must not be set in motion by anyone who is not trained and competent in its operation.

IMPORTANT NOTES

- The greater the degree of accuracy attained in machining, the less lapping is necessary.
- Valves and seats must be lapped independently, by the using a suitable lapping plates.
- Do not attempt to lap out deep imperfections.
- Use the lapping adhesives sparingly. The natural porosity of the lapping plate can hold all the abrasive which is necessary, particularly when finishing.
- Keep the lapping plates perfectly flat, and after lapping any part, the lapping plate should be reconditioned before re-using.
- Thoroughly clean abrasives compounds before rebuilding the valve.

Disc clips:- The dimensions taken must be reported to those rebuilding the valve to see that the disc clip (where fitted) is correct. Machining and Lapping seats and discs will reduce the disc clip clearance which is necessary for these valves to operate.

Clearance that must be maintained after lapping, the flange of the disk must be machined to compensate.



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