Thickness and Width Gauge for Strip and Profile
(with lateral guide rollers)

VBK 2596/12E/RSF

Operating- & Service Instructions
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Subject to change without prior notice

Please order spares referring to the part number and drawing number of the enclosed documentation drawings
Safety Precautions, please read carefully!

Keep off the gauge while the strip is running or while it is under tension.

The gauge has an easy running slide base. Fasten the slidebase to the gauge before carrying the gauge. Otherwise your fingers might get crushed in the slidebase or the gauge or the slidebase might fall down while they are carried.

As the gauge has pneumatically operated upper guide rollers, it is not allowed to work between the rollers unless the compressed air supply for the rollers (at the rear side of the gauge) is disconnected; DANGER OF FINGER INJURIES

This manual has to be handed to the machine operator, and one copy must be permanently available to operator and service personnel.

Nobody is allowed to work on or with the gauge, before he has read and understood this manual. Feel free to call the Vollmer company in case of any questions (phone +49 2334 507 0).

Warning, Crushing Hazard! In some applications this gauge has a hydraulic traverse unit. It has to be switched to the mode 'Service I', before anybody enters the danger zone. When operating in the standard mode ('Service 0') the gauge might rush back or forward unexpected and uncontrollable.

Intended use of this machine

This gauge must be used exclusively for the measurement of cold strip or profile as specified in the order. It must be firmly installed in its intended position and electrically, electronically, hydraulically and pneumatically connected as intended by the Vollmer company. Any alteration might cause severe damage.
Design and Function

The new VBK 2596/12 is designed to measure simultaneously thickness and width of narrow strip and profile on mills or on inspection lines. The gauge measures the passing material continuously in its measurement mouth which has a depth of 20 mm. In order to ease the reading, the following sections of this manual will not always refer to strip and profile, but sometimes only to strip.

The strip first passes the thickness measurement frame with two thickness feelers measuring the running strip simultaneously from the top and from the bottom. The distance between the feeler tips is measured by a transducer which is integrated into the mechanism. Due to strip thickness changes, the feeler tips are pushed apart or come closer. The tips are crowned and polished diamonds, which do not leave any marks on the strip.

The second frame is for width measurement, and works in the same way as the thickness measurement frame.

Each of the two transducers is connected to a PC interface which then processes and evaluates the measurement data. The software is described in a separate manual.
As an option, the VBK 2596 gauge can be equipped with a lateral guiding. The guiding consists of two adjustable rollers with perpendicular axles. Those rollers guide the gauge head so that it follows the lateral strip movements. With this option, the gauge head needs to be mounted on an easy motion slidebase.
Measurement head adjustment

Installation

When the gauge is installed into an inspection line, installation height and levelling of the gauge are derived from the inspection table. If the gauge was removed from its position, take care to reinstall the slidebase angular to the passline.

In rolling mills the gauge should be installed as described in the following sketch:

If possible, the gauge should be positioned between the roll gap (mill = W) and the deflector roll U. Base and the bracket K are so high that they lie under the strip by the "passline height" H (see data drawing in the documentation). Here the stroke of the vertical guiding is able to follow the expected range of strip movement.

Additional conditions are:
- base parallel to roll axes in the mill
- slidebase rectangular to the strip
- gauge must be able to traverse towards the roll middle
**Levelling**

If the strip does not run horizontally, the gauge head can be turned: Loosen clamp screw X at the rear of the gauge. Lift the gauge at the front, adjust it to the strip passline angle and clamp it again.

**Passline height**

The upper limit stop of the vertical guide should be set to a position where the lower guide rollers touch the strip edge with the upper third of their slope.

Loosen lock nut Y below nut Z, and use nut Z to adjust the gauge head to an appropriate height. Finally tighten lock nut Y.

The large aluminium knob W is used to set the tension of the suspension springs. The suspension should push the gauge head against the upper limit stop of the vertical guide, but not too hard, so that the strip is not lifted by the gauge head. In that case please do reduce the spring load. It is set correctly, when the gauge head is slightly lowered by the strip when it is forwarded to the measurement position. When measuring very thin strip, the bottom limit stop might be lowered a little, so that the lower guide rollers put less load to the strip. However, the height must not be reduced too far, as the lower guide rollers should be permanently driven by the passing strip.
Thickness measurement frame settings

Two springs push the lower thickness feeler pin against the bottom strip side. The limit stop for this is formed by bolt 70, which is locked by nut 71. The setting is correct, if the tip of the lower pin stands about 1.5 mm higher than the top of the bottom guide rollers with the two pins touching each other (i.e. there is no material in the gauge).

The knurled nut 85 can be turned to shift the C-frame backwards and forward. This allows to measure strip thickness at any distance up to approx. 15 mm from the edge.

Guide rollers

The upper guide rollers are linked by the body plate of their vertical guiding. For the measurement of profiles, they need to have a groove ground into their surface. The groove must match the size of the profile which is to
be measured, so the profile is always pushed flat onto the lower guide rollers. These rollers stabilize the gauge on the profile and they hold the material exactly rectangular to the measurement feelers.

VBK 2569 in measuring position (top) and with guide rollers pneumatically opened (below)

During measurement, the upper guide rollers are pneumatically pushed down. The pneumatic cylinder has a choke valve at its inlet. The choke was set at the factory to ensure a smooth closing of the guide rollers at a working pressure of 3 bar. Depending on the pressure of the compressed air, the choke should be set in such a way that the limit stops for the pneumatics are not hit too hard. It is sufficient when they reach their limit stop without stopping at other positions before.
Lateral guide rollers

The gap between the lateral guide rollers needs to be set to such a size, that the rollers do not deform the strip and that the strip is easily passing through the gap. It is recommended to close the gap so that the rollers are just touching the strip edges and then turn the knurled knob back for half a turn.

The gap between the lateral guide rollers LR is set by knurled knob L.
Width measurement frame settings

The setting of knurled nut 73 determines the measurement height position of the width measurement frame. It forms the bottom limit stop for the lowering frame after the compressed air supply for pneumatic cylinder 77 was shut. By screw 73, which is secured by a lock nut, the height of the diamond measurement edges can be set to the appropriate measurement height. The width measurement frame should be positioned so that the strip is measured by the center of the tips.

When cylinder 77 is under pressure, it lifts the width measurement frame, so that the gauge can be traversed on strip/off strip without damage.

The outlet of the pneumatic valve P has a choke. It was set at the factory, so that the lowering of the width measurement frame is delayed for a short time when the gauge is put on strip. This is to ensure, that the profile has been caught and positioned in the grooves of the guide rollers before the width measurement frame is lowered.

The two rings 94 form the limit stops for lateral movements of the width measurement frame. They are correctly set if the pins do not touch the strip edge when the width measurement frame is lowered.
The measurement frame is being lowered for measurement start. The setting of the rings does not need to be changed as long as the center position between the two measurement feeler pins remains the same, that is if the pins are not shifted or if they are shifted symmetrically.

If the original positions of the two rings 94 are lost, set the front ring in such a way that the front side (= operator side) feeler pin does not touch the strip edge whilst the width measurement frame is lowered. Set the rear ring 94 to a position where the width measurement frame has a clearance of 15 to 20 millimetres.

If the material, which is to be measured, exceeds the width of 25 mm, the gauge can be adjusted by altering the position of the measurement feeler pins. Both pins must be shifted for the same distance, so that the centre point between the two pins is not shifted. If each pin is shifted for e.g. 5 mm, the gauge can measure strip of a width from 10 to 35 millimetres. Use a slip gauge of appropriate size for new zero setting under consideration of the altered mechanical offset.

If both pins were removed and the centre position is lost, allow the two measurement arms to come together to their mechanical limit stop. Then measure the distance between the two arms (at the clamp bores for the feeler pins). Insert the feeler pins so that each of them sticks out for about 0.5 to 1 mm more than half of this distance. This is the new zero.
Measurement

Zero check

Zero checking should be performed regularly. Set the gauge to nominal size zero and check the indication. It should be zero.

Measurement start and end

Operate the pneumatic valve to lift the upper guide rollers and the width measurement frame. Then release the pneumatic break and pull the gauge on strip. Activate the pneumatic break to hold the gauge in position on its easy running slide base. Now feed the strip end through the gauge and into the next strip guiding device before operating the pneumatic valve again to shut the guide rollers and to lower the width measurement frame. Check if the width measurement feeler pins and the thickness measurement feeler pins measure the strip at the intended positions. The PC monitor does now indicate the measurement data.

Important note

The strip end must never run through the gauge! It would probably cause severe damage on the gauge.

Continuous check

In between the service intervals, it is recommended to check the gauge regularly:

Accuracy check with slip gauge: Set the gauge to the nominal size of the slip gauge, and insert slip gauge between the transducer tips. The indication should be zero. In case of tight tolerances check daily, otherwise weekly.

Feeler pin position to the strip: For most gauges, the Vollmer company offers a special adjustment plate with an integrated slip gauge, which is individually selected to match the thickness of that strip which is usually rolled on your mill.

Guide rollers: Check for easy rotation.

Passline: Check the correct height of the gauge to the strip.
Strip breaking

The gauge is mounted onto the slidebase with two shear blocks. This is to prevent the gauge and its suspension from destruction in case of strip breaking. The shear block B are made from cast iron and easy to replace. In case of overload they shear off, so that the gauge and its suspension can move with the broken strip.

Please check the gauge zero after each strip breaking. If it has not changed, measurement can continue immediately.

If the gauge zero has shifted for a minor amount, set the measurement amplifier to zero and check again. Check a the gauge with a slip gauge, which is integrated into the adjustment plate (addition, available from Vollmer). If these points are all right, measurement can go on.

If the measurement does not indicate the exact thickness of the sample, check the whole gauge. Take special care of the diamond measurement edges, the easy movement of the feeler pins and the alignment of the feeler pin holes in the measurement frames.
Maintenance

The thickness gauge does not need much maintenance. Only the measurement tips with the diamonds and the guide rollers are subject to wear. From time to time the gauge should be cleaned in order to avoid dirt deposits which might block movable parts.

At least the following points must be checked regularly, even if measurement results and symmetry are correct

Guide rollers

- Clearance?
  The rollers have to move freely. They should have only little axial clearance. Blocking rolls mark the strip.
  ⇒ Replace defective rollers

- Deposits on the surface?
  Some strip materials leave deposits on the rollers. They cannot run smooth on the strip and might mark the strip.
  ⇒ replace rollers (rework if possible)

- Roller support defective?
  Check regularly, if the upper guide rollers run smooth in their vertical guides, and if they move down to their mechanical limit stop when the compressed air is switched off.
  ⇒ clean the ball guides if the rollers get stuck

Measurement frame

- Easy movable?
  The measurement frame might get stuck because of large dirt deposits in the gauge mechanics, or if after long time of operation the C-frame bearing is worn. This might cause measurement errors.
  ⇒ Clean the gauge, send it to Vollmer for repair if the bearing is defective

Transducer check

- Ram easy movable?
  The measurement feeler pins must be easy to be pushed apart and spring back immediately.

- Measurement tips worn or damaged?
  If the measurement result of the slip gauge plate is not 0, but the other checks are all right, remove the transducers and check the measurement tips:

- Diamonds worn?
  The diamonds should be crowned to achieve accurate measurement results. Worn diamonds with flat spots may cause measurement errors.
  ⇒ Replace and possibly get the old diamonds reworked
• Broken diamonds?
  Cause incorrect measurement results and mark the strip
  ⇐ Replace

• Measurement tips with broken-out diamonds? (after strip breaking or when the strip end has passed through the gauge)
  ⇐ Replace

• Measurement frame distorted?
  Take an inspection pin to check the alignment of the feeler pin clamp bores in the measurement frames. The pin must slide easily through both bores. If not, do not try to straighten the C-frame by yourself,
  ⇐ send it to Vollmer for possibly repair

## Trouble shooting

### If the gauge measures wrong

• Wrong point remeasured?
  Cross profile strip thickness varies in many cases. If the gauge is checked, strip thickness must be measured in the same distance from the edge as the transducers have measured.
  ⇐ check the strip thickness at correct edge distance

• Transducers dirty?
  In a very dirty environment, the rams of transducers sometimes get too sticky, so that they do not shut completely. If the gauge is then set to zero, the indication of a following measurement is too low. After cleaning the transducer ram should slide easy in its bushing or bearing for a quite long period of time.
  ⇐ increase cleaning frequency

• Gauge zero not constant?
  If the clamp screws for the measurement feeler pins are not tight, a pin might move against its holding. If material was placed between the pins and then removed, the zero point changes. The indication is incorrect even if the symmetry is correct.
  ⇐ Fasten the clamp screws

• Indication too high?
  Put a test plate onto the lower guide rollers and tip it to both sides as well as forward and backward. The indication should deflect only towards +.
  If not,
  ⇐ check the complete gauge (measurement tips for wear, C-frame for 90° position and C-frame distortion)

• Indication too high?
  If the strip breaks or a strip end passes through the gauge, the C-frame is possibly bent. The indication is too high. Check as before and
check the alignment of measurement feeler pin clamping bores with an inspection pin

If the gauge marks the strip?

- Diamond with small cracks?
  If hit too hard, the diamonds in the transducer measurement tips might get tiny ring-shaped cracks, which are hardly visible. Sometimes such crackles mark the strip
  ⇐ replace the measurement tip

- Diamond broken out?
  In case of strip breaking the diamonds might break out of the measurement tips.
  ⇐ replace the measurement tip
- Roller blocked?
  ⇐ Replace roller. If the roller surface is not damaged, replace only the bearings.