

# Working Instructions

## for Röben facing, clinkers and ceramic clinkers

All of the hard burnt brick we manufacture are bricks in conformity with DIN EN 771-1 or DIN 105-100. Beyond this, all of our products are produced from the natural construction material of clay where certain variations in colour and surface quality are a part of it. This is why the total amount required has to be placed when ordered. When working these bricks, they have to be removed stairwise and simultaneously cross mixed from at least four to five packages to obtain a natural range of colours. If several packages are delivered, make sure that the various deliveries can also be cross mixed. In other words, you should not just use up all of the bricks then and wait for the next delivery. Instead, you should leave at least four to five pallets over and mix them with the following delivery. Finally, they should be stored to avoid damage while the material should be protected against soiling and weather.

Remember to stick to the craftsman's rules for bricklaying as described in DIN 1053-1 and always use IIa or II mortar groups. MG III mortar group may also be used for subsequent jointing. In any event, you should lay bricks flush-jointed and bonding well. Cavities in the mortaring let water enter thus substantially boosting the risk of efflorescing or leaching. Röben recommends the design with smoothed joints and using factory dry mortars. With all hard burnt bricks, the mortar has to be matched to the suction properties of the bricks. For instance, suction-quality facing and clinkers have to be pre-moistened especially in dry weather so that the material does not absorb the

mixing water of the mortar with the alkali components in it. Beyond this, follow the working instructions strictly when using prefabricated factory dry mortars. An example is no working below 5° C. Fresh masonry or masonry without joint-sealing should be protected from the impact of weather. When work is interrupted, fresh masonry should be covered with foil. Also please remember that rain water should not be allowed to fall from the carcass onto the fresh masonry (such as from rainfall pipes not connected or draining weathered carcass covers). Furthermore, covers should be used to protect masonry that is upwardly open (such as window parapets or pier heads) against moisture penetrating. ½ or ¾ or other saw bricks should be cut (not striking) with the appropriate material making sure to avoid soiling from remaining mortar when making the masonry. This is why any soiling should be removed when it is still fresh.

With smoothed joints, bricking and jointing is done in one step filling the joints with mortar and making sure not to leave any cavities so they can be smoothly painted and flush with the masonry surface. This method is not only state-of-the-art. It is the safest design for making sealed masonry. In any event, make sure that the mortar is consistent to avoid colour differences in the joint. What's more, with subsequent jointing the joints should be raked out evenly with clean flanks about 15-20 mm deep. This should be done before every phase of work as long as the wall mortar is still plastic and allows it. Jointing should be done

with the MG II and MG IIa or MG III mortar groups making sure that the jointing mortars does not dry too quickly and taking appropriate action to prevent it especially in hot weather.

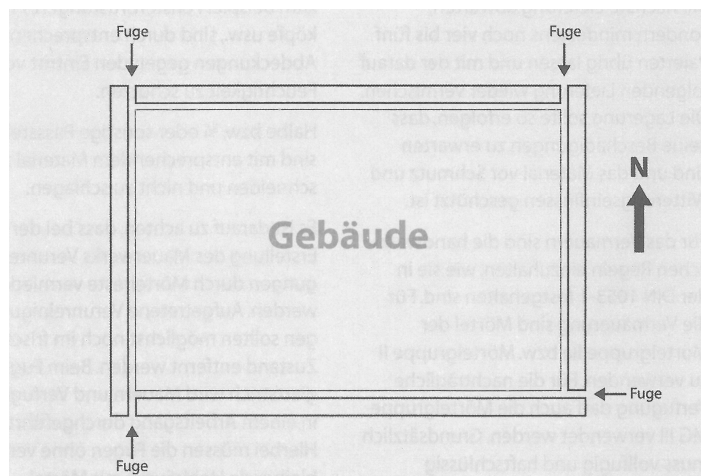
Finally, VOB DIN 18330 says that cleaning water may not have any products added that contain acids for cleaning façade surfaces because they (and hydrochloric acid) attack the mortar bonds and cause discoloration on the surface of the clinkers especially with bright ceramic clinkers. In other words, always make absolutely sure that there is no soiling during the manufacturing process. If cleaning is necessary, it should be done with a root brush and wood spatula when dry. You can also clean it with a steam jet device or rotation process where soiling is removed with fine granulate.

### We would like to repeat the following points once again:

1. Store stones on the construction site properly.
2. Work bricks from several packages at the same time to obtain an even appearance.
3. Use prefabricated wall mortar that is matched to the suction properties of the bricks.
4. Avoid soiling and work masonry in smoothed joints.
5. Protect fresh masonry from weather and soiling.
6. Do not use any acids when cleaning.
7. Protect subsequent jointing from weather or drying out too quickly.
8. Do not work below 5° C daily medium temperature.

# Expansion joints in facing masonry

1. The shape-changing properties of masonry construction materials can cause cracks. However, you can avoid damage by correctly arranging expansion joints.
2. Section 5.2.1.i of DIN 1053 (Masonry, Calculation and Implementation) states that expansion joints should be arranged in the exterior leaf of two-leaf facing masonry. Beyond this, spaces should be inserted depending upon the climatic strain as well as the specific material properties of the construction material and design. This is why the exterior leaf should also be able to move freely in the vertical direction. There are not any defined values for the distance between joints, nor are there any conclusive findings of research on the deformation properties.
3. The structural engineer can calculate points of reference for the spaces between expansion joints applying theoretical masonry stress. This not only has to include material indicators for masonry in the calculation in conformity with Table 9 of DIN 1053, the effect of temperature and the tension, adhesion and shearing strength, but also the degree of impediment depending upon the design. In spite of all this, findings may only be approximately correct since it is not possible to determine the actual conditions at the construction site ahead of time such as installation temperature, temperature difference, mortar/stone strength and the aforementioned degree of impediment.
4. Table 9 of DIN 1053 has *Calculating values for deformation properties in masonry* for estimating the scale of material deformation and calculating the spaces between joints.
5. The approximate calculation of the spaces between expansion joints produce values between 8 and 12 m with brick masonry.
6. Expansion joints are needed at least around building corners if there is insufficient heat dissipation from the facing shell, with high-temperature heat insulating back-up block systems (without a layer of air) and with major connected facing surfaces (see the sketch), primarily on walls facing west.
7. Horizontal settlement joints are needed under contact surface consoles – with holding facing masonry. Beyond this, connections to other construction materials (such as concrete, wood and metal) should also be formed as settlement joints while expansion joints in the building units also have to be led through the facing shell.
8. Expansion joints should be dimensioned especially carefully with two-shell facing masonry equipped with core insulation (filled insulating material or core insulating boards). We recommend arranging joints on building corners (see the sketch)
9. The facing shell areas rigidly bonded with the load-bearing masonry of the interior shell (such as holding surfaces and surfaces in the area of parapets, balconies and loggias) have to be separated by joints of continuous and freely moving façade areas.



An example of how settlement joints are arranged on the corners of buildings