

# WARPAGE, LIPPAGE, GROUT JOINTS, LEVELING SYSTEMS

- 1) MAJORITY OF LIPPAGE IS CAUSED BY ATTEMPTING TO COMPENSATE UNEVEN SUBSTRATE WITH IMPROPER USE OF THINSET.
- 2) ANSI A108.19: MUST GET SUBSTRATE FLATNESS WITHIN TOLERANCE BEFORE BEGINNING INSTALLATION & GET PAID FOR PREPARATION COSTS.
- 3) ALL TILES ARE WARPED TO SOME DEGREE DUE TO FIRING PROCESS SHRINKAGE.

## ANSI A108.02 4.3.7 ACCEPTABLE LIPPAGE GUIDELINES

Tile Type	Tile Size	Joint Width	Allowable Lippage
Glazed Wall / Mosaic	1" x 1" to 6" x 6" (25 x 25mm to 150 x 150mm)	1/16" (1.5mm) to 1/8" (3mm)	1/32" (0.8mm)
Quarry	6" x 6" (150 x 150mm) to 8" x 8" (200 x 200mm)	1/8" (3mm) or greater	1/16" (1.5mm)
Porcelain	All	1/16" to less than 1/8" (change to floor)	1/32" (0.8mm)
Pressed Floor Tile	All	1/8" (3mm) or greater	1/16" (1.5mm)
Gauged Porcelain Tiles (GPT and GPT Paper/Stone)	All	All	1/32" (0.8mm)

GAUGED TILES = THIN TILES = EX TPT (THIN PORCELAIN TILES)  
 GPT < 36" x 36" = 1M x 1M  
 GPT > 36" x 36" = 1M x 1M  
 GAUGED WALL 3.5MM - 4.9MM / GAUGED FLOOR 5MM - 6.5MM

## ANSI A137.1 ALLOWABLE WARPAGE OF DIFFERENT TILES

Tile Type	Warpage Edge Maximum	Warpage Edge Minimum	Warpage Diagonal Maximum	Warpage Diagonal Minimum
Mosaic	-0.005"	0.005"	-0.010"	0.010"
Quarry	-0.005" or -0.16" (-1.3mm) / (-4.3mm)	0.005" or 0.16" (1.3mm) / (4.3mm)	-0.010" or -0.17" (-2.5mm) / (-4.3mm)	0.010" or 0.17" (2.5mm) / (4.3mm)
Glazed Wall Tile ≥ 6" (160mm)	-0.005" or -0.04" (-1.3mm) / (-1.0mm)	0.005" or 0.05" (1.3mm) / (1.3mm)	-0.010" or -0.05" (-2.5mm) / (-1.3mm)	0.010" or 0.05" (2.5mm) / (1.3mm)
Glazed Wall Tile ≥ 6" (Rectified)	-0.005" or -0.04" (-1.3mm) / (-1.0mm)	0.005" or 0.05" (1.3mm) / (1.3mm)	-0.010" or -0.05" (-2.5mm) / (-1.3mm)	0.010" or 0.05" (2.5mm) / (1.3mm)
Pressed Floor Tile (Natural)	-0.005" or -0.12" (-1.3mm) / (-3.0mm)	0.005" or 0.12" (1.3mm) / (3.0mm)	-0.010" or -0.17" (-2.5mm) / (-4.3mm)	0.010" or 0.17" (2.5mm) / (4.3mm)
Pressed Floor Tile ≥ 6" (Calibrated)	-0.5% or -0.08" (-2.0mm) / (-2.0mm)	0.5% or 0.08" (2.0mm) / (2.0mm)	-0.50% or -0.08" (-12.5mm) / (-12.5mm)	0.50% or 0.08" (12.5mm) / (12.5mm)
Pressed Floor Tile ≥ 6" (Rectified)	-0.40% or -0.05" (-1.3mm) / (-1.3mm)	0.40% or 0.05" (1.3mm) / (1.3mm)	-0.40% or -0.05" (-10.4mm) / (-10.4mm)	0.40% or 0.05" (10.4mm) / (10.4mm)
Porcelain Tile ≥ 6" (Calibrated)	-0.5% or -0.08" (-1.3mm) / (-1.3mm)	0.5% or 0.08" (1.3mm) / (1.3mm)	-0.50% or -0.08" (-12.5mm) / (-12.5mm)	0.50% or 0.08" (12.5mm) / (12.5mm)
Porcelain Tile ≥ 6" (Rectified)	-0.024% or -0.03" (-0.8mm) / (-0.8mm)	0.024% or 0.03" (0.6mm) / (0.6mm)	-0.024% or -0.03" (-0.6mm) / (-0.6mm)	0.024% or 0.03" (0.6mm) / (0.6mm)
Porcelain Tile ≥ 6" (Rectified)	-0.005" or -0.05" (-1.3mm) / (-1.3mm)	0.005" or 0.05" (1.3mm) / (1.3mm)	-0.010" or -0.05" (-2.5mm) / (-1.3mm)	0.010" or 0.05" (2.5mm) / (1.3mm)

"INHERENT WARPAGE"

CALIBRATED = SORTED TO MEET MANUFACT. CALIBER RANGE  
 RECTIFIED = ALL EDGES MECHANICALLY FINISHED

- 4) EXP: 1/16" GROUT JOINT (2MM APPRX) ALLOWS 1/32" (1MM APPRX) LIPPAGE + 12" x 24" RECT. (30cm x 60cm) ALLOWS ANOTHER 1/32" (1MM) WARPAGE. TOTAL LIPPAGE + WARPAGE: APPRX 1/16" = 2MM WITH SOME EXCEPTIONS
- 5) ANSI A108.02 4.3.8 GROUT JOINTS RECTIF. TILES > 15" = MINIMUM 1/8" (APPR. 3MM) & 3/16" (4.5MM APPRX) FOR CALIBRATED TILES > 15" PLUS WARPAGE OF THE LONGEST EDGE SHOULD BE ADDED... SO 1/8" + 1/32" = 5/32" (APPRX. 4MM)
- 6) NEVER SHOULD THE GROUT JOINT BE LESS THAN 1/16" (APPRX. 2MM)....
- 7) FOR OFFSET INSTALLATION WITH TILES > 18" (45cm) MAXIMUM OF 33% STAGGERING IS ALLOWED
- 8) NTCA "CRITICAL LIGHTING EFFECT" EXP. AT LEAST 12" FROM THE WALL (LIPPAGE PERCEPTION) ALSO NATURAL LIGHT THROUGH WINDOWS & DOORS AT SOME ANGLES ( " )
- 9) HIGHLY POLISHED/REFLECTING TILES CAN TRIGGER LIPPAGE PERCEPTION

LEVELING SYSTEMS WITH SKILLED WORKMANSHIP WILL HELP REDUCING LIPPAGE & GROUT JOINTS ESPECIALLY IN LARGE FORMATS