Brightness: **62 lux** Covering: ☐

Size: **5 cm** Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	**Plaintext**	**Code128**	**QR1**	**QR2**	**VuMark**
10 + 0	-	++			
10 + 10	++	++			
10 + 20	++	--			
10 + 30	--				
20 + 0	--	++			
20 + 10	++	--			
20 + 20	++				
20 + 30	++				
20 + 40	--				
30 + 0	-				
30 + 10	--				
60 + 0			++	++	++
60 + 30			++	++	++
60 + 60			--	--	++
60 + 90					++
60 + 100					--
80 + 0			--	-	++
80 + 20			--	--	++
80 + 40				--	++
80 + 100					++
80 + 120					--
100 + 0			--	--	-
100 + 50					++
100 + 90					++
100 + 100					--
150 + 0					-
150 + 50					-

Brightness: 0 lux Covering: ☐

Size: 10 cm Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext		Code128		QR1		QR2		VuMark	
20 + 0	++		++							
20 + 20	++		++							
20 + 30	--		++							
20 + 40			--							
30 + 0	++		++							
30 + 20	++		++							
30 + 30	--		++							
30 + 40			-							
30 + 50			--							
40 + 0	++		++							
40 + 20	++		++							
40 + 40	++		++							
40 + 60	-		--							
40 + 70	-									
40 + 80	--									
50 + 0	++		++							
50 + 10	++		++							
50 + 20	-		++							
50 + 30	--		++							
50 + 50			++							
50 + 60			--							
80 + 0	-		--							
80 + 20	-		--							
80 + 40	-									
80 + 60	--									
90 + 0	--									

Brightness: 0 lux Covering: ☐

Size: 10 cm Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext		Code128		QR1		QR2		VuMark	
80 + 0					--		++		-	
80 + 30					++		++		++	
80 + 60					++	> 10*	++		++	
80 + 90					--		--		++	
80 + 120									--	
100 + 0					++		--		-	
100 + 50					--		++		++	
100 + 80							--		++	
100 + 140									++	
100 + 160									++	
100 + 180									++	> 10*
100 + 200									++	> 10*
100 + 220									--	
140 + 0					--		--		-	> 10*
140 + 50					--		--		-	> 10*
140 + 100									++	> 10*
140 + 150									++	> 10*
140 + 200									--	
170 + 50									-	> 10*
170 + 100									-	> 10*
170 + 150									-	> 10*
170 + 200									--	

Notes:

* It took over 10 seconds to recognize it

Brightness: **62 lux** Covering: ☑*

Size: **10 cm** Movement: ☐

Experiment 1

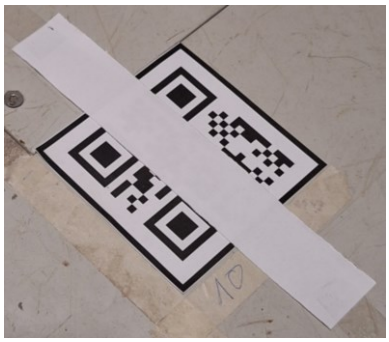
Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
80 + 0			++	++	
80 + 30			++	++	
80 + 60			--	++	
80 + 90				++	
80 + 120				--	
100 + 0			++	++	
100 + 50			--	++	
100 + 80				++	
100 + 100				--	
140 + 0			--	++	
140 + 50			--	--	
140 + 100				--	
170 + 0			--	--	
170 + 50			--	--	
			--	--	

Notes:

* 33 % concealment that covers the center of the markers



Brightness: **62 lux** Covering: ☑*

Size: **10 cm** Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
80 + 0			++	++	++
80 + 30			++	++	++
80 + 60			++	++	++
80 + 90			--	++	++
80 + 120				--	++
80 + 150					++
80 + 180					++
80 + 210					--
100 + 0			++	++	++
100 + 50			--	++	++
100 + 80				++	++
100 + 100				--	++
100 + 150					++
100 + 170					++
100 + 180					++
100 + 200					--
140 + 0			++	++	++
140 + 50			--	++	++
140 + 100				--	++
140 + 150					++
140 + 200					++
140 + 250					--
170 + 0			--	--	-
170 + 50					++
170 + 100					++
170 + 150					++
170 + 200					--

Brightness: 62 lux Covering: ☑*

Size: 10 cm Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
80 + 0			++	++	
80 + 30			++	++	
80 + 60			--	++	
80 + 90				--	
100 + 0			-	++	
100 + 50			--	++	
100 + 80				--	
140 + 0			--	--	
140 + 50			--	--	

Notes:

* 33 % concealment that covers the markers at an angle

Brightness: 62 lux Covering: ☑*

Size: 10 cm Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
80 + 0			++	++	++
80 + 30			++	++	++
80 + 60			++	++	++
80 + 90			--	++	++
80 + 120				--	++
80 + 150					++
80 + 180					++
80 + 210					--
100 + 0			++	++	++
100 + 50			--	++	++
100 + 80				++	++
100 + 100				--	++
100 + 150					++
100 + 170					++
100 + 180					++
100 + 200					--
140 + 0			++	++	++
140 + 50			--	++	++
140 + 100				--	++
140 + 150					++
140 + 200					++
140 + 250					--
170 + 0			--	--	-
170 + 50					++
170 + 100					++
170 + 150					++
170 + 200					--

Brightness: 62 lux Covering: ☑*

Size: 10 cm Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
80 + 0			++	++	
80 + 30			++	++	
80 + 60			++	++	
80 + 90			--	++	
80 + 120				--	
100 + 0			++	++	
100 + 30			-	++	
100 + 50			--	++	
100 + 80				++	
100 + 100				--	
140 + 0			++	++	
140 + 50			--	++	
140 + 100				--	
170 + 0			--	--	
170 + 50			--	--	
			--	--	

Notes:

* 33 % concealment that covers the markers on the side

Brightness: 62 lux Covering: ☑*

Size: 10 cm Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
80 + 0			++	++	++
80 + 30			++	++	++
80 + 60			++	++	++
80 + 90			--	++	++
80 + 120				--	++
80 + 150					++
80 + 180					++
80 + 210					--
100 + 0			++	++	++
100 + 50			--	++	++
100 + 80				++	++
100 + 100				--	++
100 + 150					++
100 + 170					++
100 + 180					++
100 + 200					--
140 + 0			++	++	++
140 + 50			--	++	++
140 + 100				--	++
140 + 150					++
140 + 200					++
140 + 250					--
170 + 0			--	--	-
170 + 50					++
170 + 100					++
170 + 150					++
170 + 200					--

Brightness: **62 lux** Covering: ☐

Size: **10 cm** Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	**Plaintext**	**Code128**	**QR1**	**QR2**	**VuMark**
20 + 0	++	++			
20 + 20	++	++			
20 + 30	--	++			
20 + 40		--			
30 + 0	++	++			
30 + 20	++	++			
30 + 30	--	++			
30 + 40		-			
30 + 50		--			
40 + 0	++	++			
40 + 20	++	++			
40 + 40	++	++			
40 + 60	-	--			
40 + 70	-				
40 + 80	--				
50 + 0	++	++			
50 + 10	++	++			
50 + 20	-	++			
50 + 30	--	++			
50 + 50		++			
50 + 60		--			
80 + 0	-	--			
80 + 20	-	--			
80 + 40	-				
80 + 60	--				
90 + 0	--				

Brightness: **62 lux** Covering: ☐

Size: **10 cm** Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
80 + 0			++	++	++
80 + 30			++	++	++
80 + 60			++	++	++
80 + 90			--	++	++
80 + 120				--	++
80 + 150					++
80 + 180					++
80 + 210					--
100 + 0			++	++	++
100 + 50			--	++	++
100 + 80				++	++
100 + 100				--	++
100 + 150					++
100 + 170					++
100 + 180					++
100 + 200					--
140 + 0			++	++	++
140 + 50			--	++	++
140 + 100				--	++
140 + 150					++
140 + 200					++
140 + 250					--
170 + 0			--	--	-
170 + 50					++
170 + 100					++
170 + 150					++
170 + 200					--

Brightness: **335 lux** Covering: ☐

Size: **10 cm** Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	**Plaintext**		**Code128**		**QR1**		**QR2**		**VuMark**	
20 + 0	++		++							
20 + 20	++		++							
20 + 30	--		--							
30 + 0	++		++							
30 + 20	++		++							
30 + 30	--		++							
30 + 40			--							
40 + 0	++		++							
40 + 20	++		++							
40 + 40	++		++							
40 + 60	--		--							
50 + 0	++		++							
50 + 10	++		++							
50 + 20	--		++							
50 + 30	--		++							
50 + 50			++							
50 + 60			--							
60 + 0	++		++							
60 + 20	++		++							
60 + 40	-		++							
60 + 60	--		--							
70 + 0	-		++							
70 + 20	-		++							
70 + 40	--		--							
80 + 0	-		--							
80 + 20	-		--							
80 + 40	--									
90 + 0	--									

Brightness: **335 lux** Covering: ☐

Size: **10 cm** Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
80 + 0			++	++	++
80 + 30			++	++	++
80 + 60			++	++	++
80 + 90			--	++	++
80 + 120				--	++
80 + 150					++
80 + 180					++
80 + 210					--
100 + 0			++	++	++
100 + 50			--	++	++
100 + 80				++	++
100 + 100				--	++
100 + 150					++
100 + 170					++
100 + 180					++
100 + 200					--
140 + 0			--	++	++
140 + 50			--	++	++
140 + 100				--	++
140 + 150					++
140 + 200					++
140 + 250					--
170 + 0			--	--	++
170 + 50					++
170 + 100					++
170 + 150					++
170 + 200					--

Brightness: **62 lux** Covering: ☐

Size: **15 cm** Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	**Plaintext**	**Code128**	**QR1**	**QR2**	**VuMark**
20 + 0	++	++			
20 + 10	++	++			
20 + 20	++	--			
20 + 30	--				
20 + 40					
30 + 0	++	++			
30 + 10	++	--			
30 + 20	++				
30 + 40	--				
30 + 60	--				
30 + 80					
40 + 0	++	--			
40 + 20	++	++			
40 + 40	++	--			
40 + 60	--				
40 + 80					
40 + 100					
50 + 0	++	--			
50 + 20	++	--			
50 + 40	++	--			
50 + 60	++				
50 + 80	--				
50 + 100					
60 + 0	++				
60 + 20	++				
60 + 40	++				
60 + 60	--				
60 + 80					
60 + 100					
80 + 0					
80 + 20	++				
80 + 40	++				
80 + 60	--				

Brightness: **62 lux** Covering: ☐

Size: **15 cm** Movement: ☐

Experiment 1

Boreholes

Niche Sandwich

Distance: Vertical + Parallel	Plaintext	Code128	QR1	QR2	VuMark
100 + 0			++	++	++
100 + 50			++	++	++
100 + 100			++	++	++
100 + 150			--	--	++
100 + 250					--
100 + 275					
140 + 0			++	++	-
140 + 50			++	++	++
140 + 100			++	++	++
140 + 125			--	++	++
140 + 300				--	++
140 + 325					--
170 + 0			--	++	-
170 + 50			++	++	++
170 + 100			++	++	++
170 + 125			--	--	++
170 + 275					++
170 + 300					--

Brightness: 10 lux

Movement: ☑

Experiment 2

Wall segments + running meter

Niche Sandwich

Distance: Vertical + Parallel	Plaintext		Code128		QR1		QR2		VuMark	
20	++	*	++	*						
40	--		-							
60			--		++		++		++	
80					++		++		++	
100					++		++		++	
120					++		++		++	
140					--		++		-	
160							--		-	
180									-	
200									-	
250									-	
300									-	

Notes:

* Scanned one after the other

Brightness: 10 lux

Movement: ☑

Experiment 2

Wall segments + running meter

Niche Sandwich

Distance: Vertical + Parallel	Plaintext		Code128		QR1		QR2		VuMark	
20	++	*	++	*						
40	--		--							
60					++		++		++	
80					--		++		++	
100							--		++	
120									++	
140									++	
160									++	
180									++	
200									++	
240									++	
260									--	

Notes:

* Scanned one after the other

Brightness: 90 lux (right), 377 lux (left)
Movement: ☑

Experiment 3

4 boreholes

Niche CL

Distance: Vertical + Parallel	Plaintext		Code128		QR1		QR2		VuMark	
right:										
50 + 50	--		--		++		++		++	
100 + 100	--		--		++		++	(3)	++	(2)
150 + 150					--		--		--	
200 + 200									--	
left:										
50 + 50	--		--		++		++		++	(3)
100 + 100	--		--		++	(3)	++	(1)	++	(3)
150 + 150					--		--		--	
200 + 200									--	

Notes:

*(...) Number of recognized markers