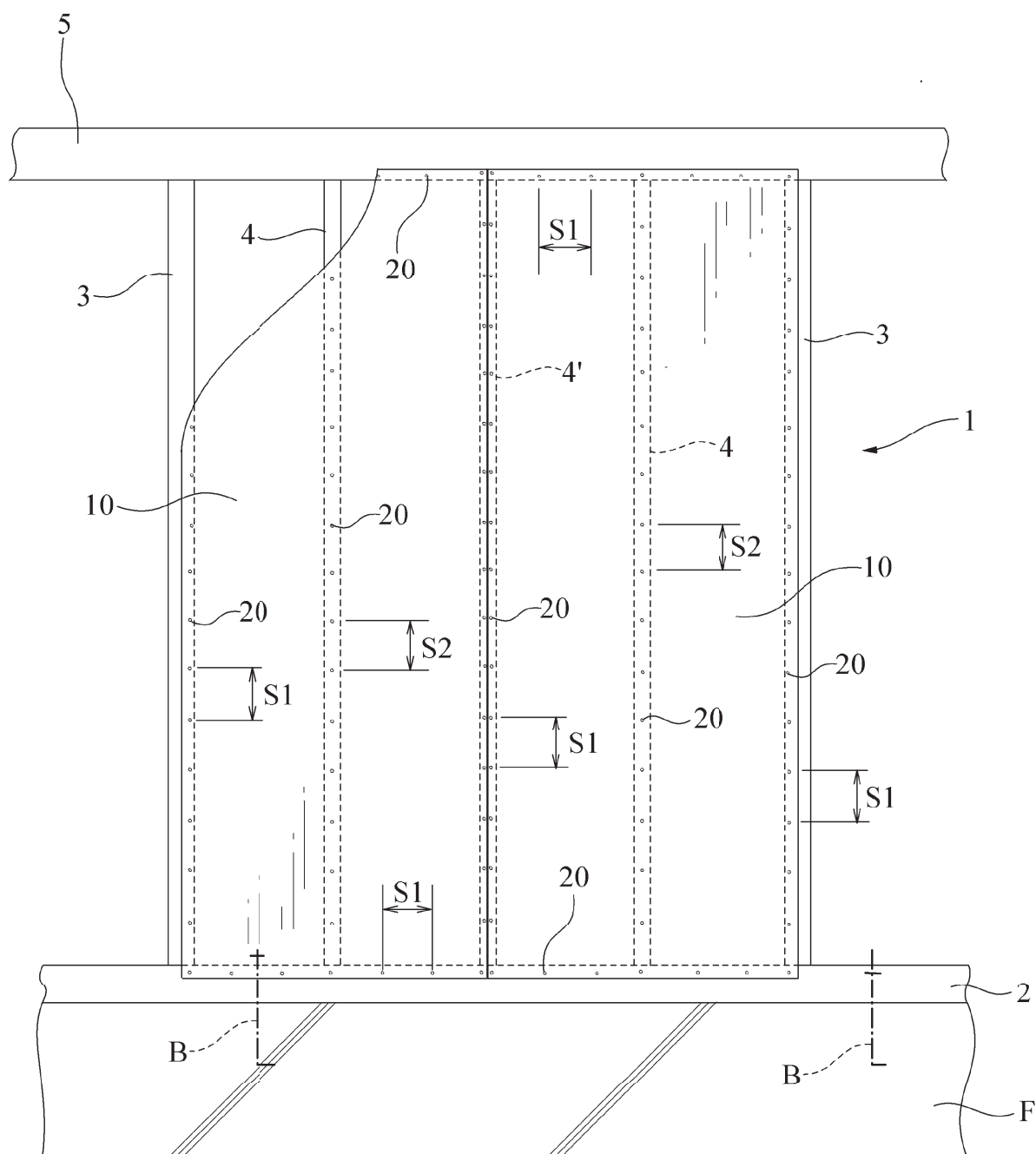
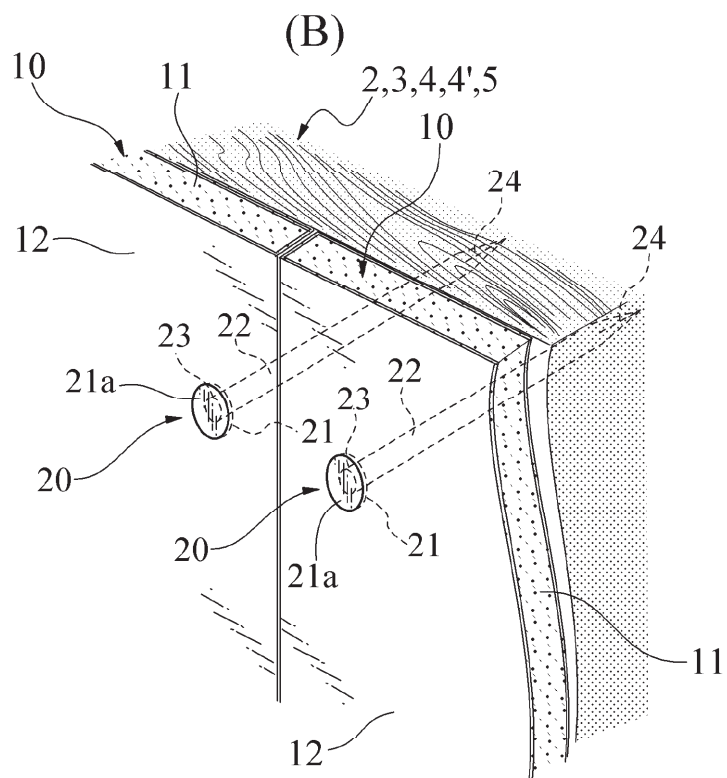
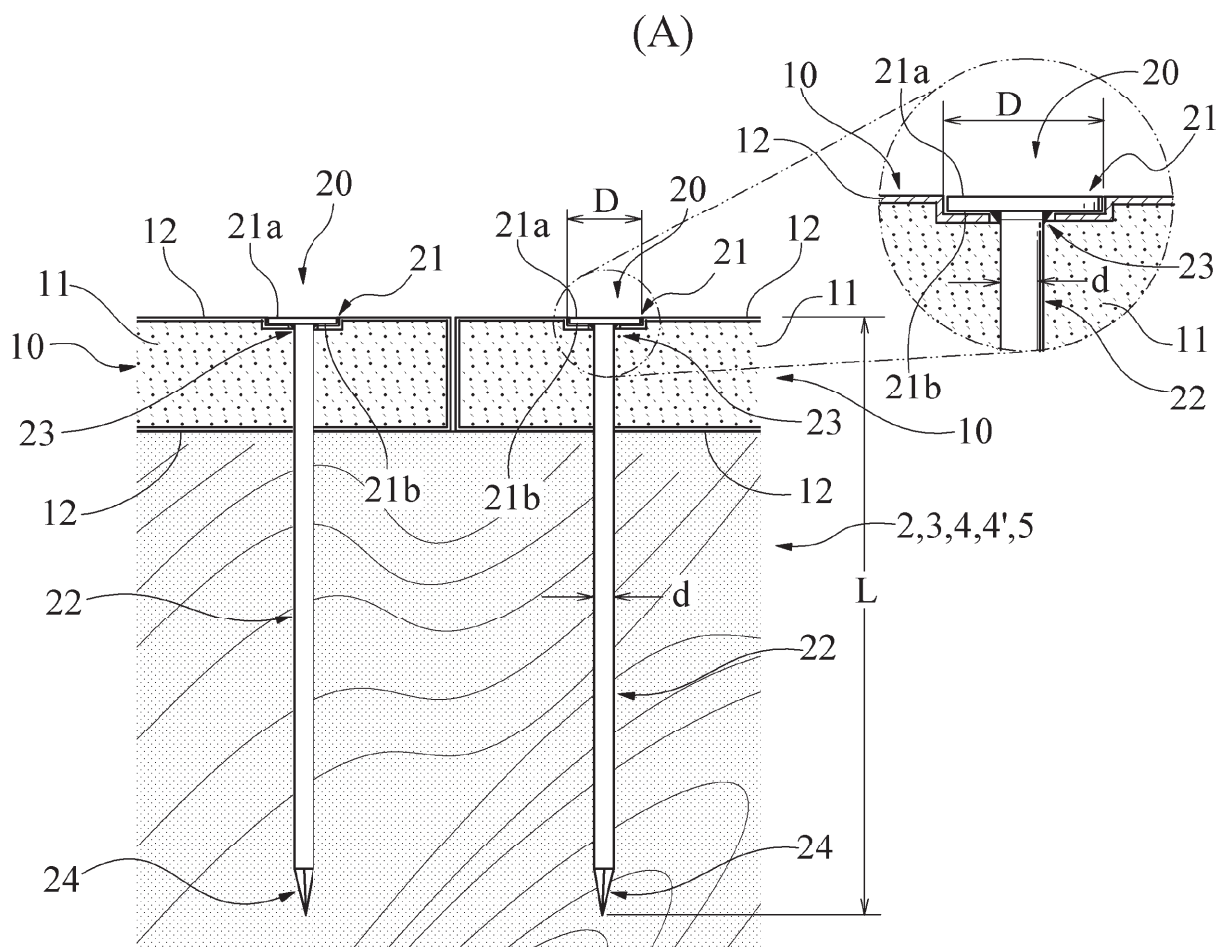
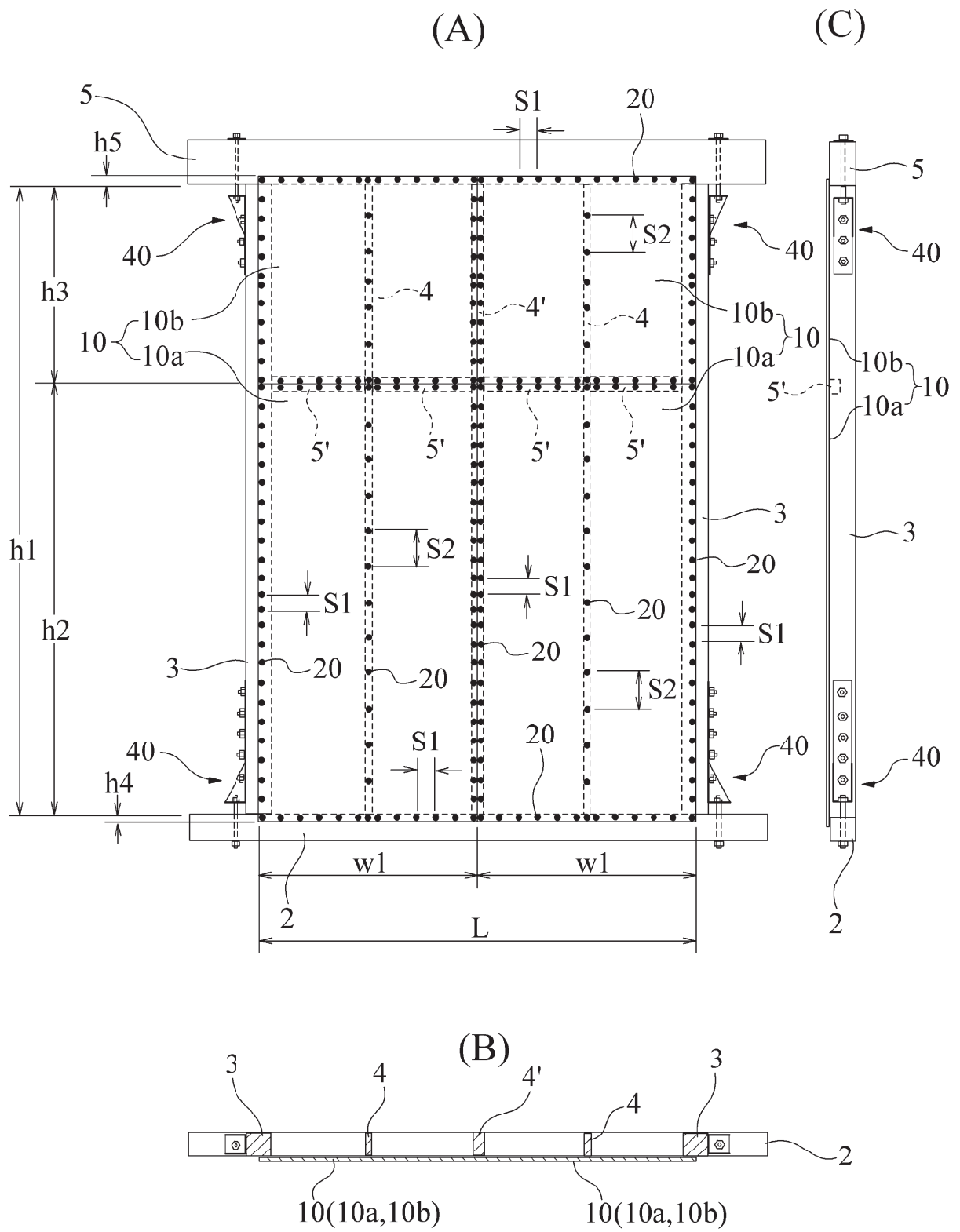




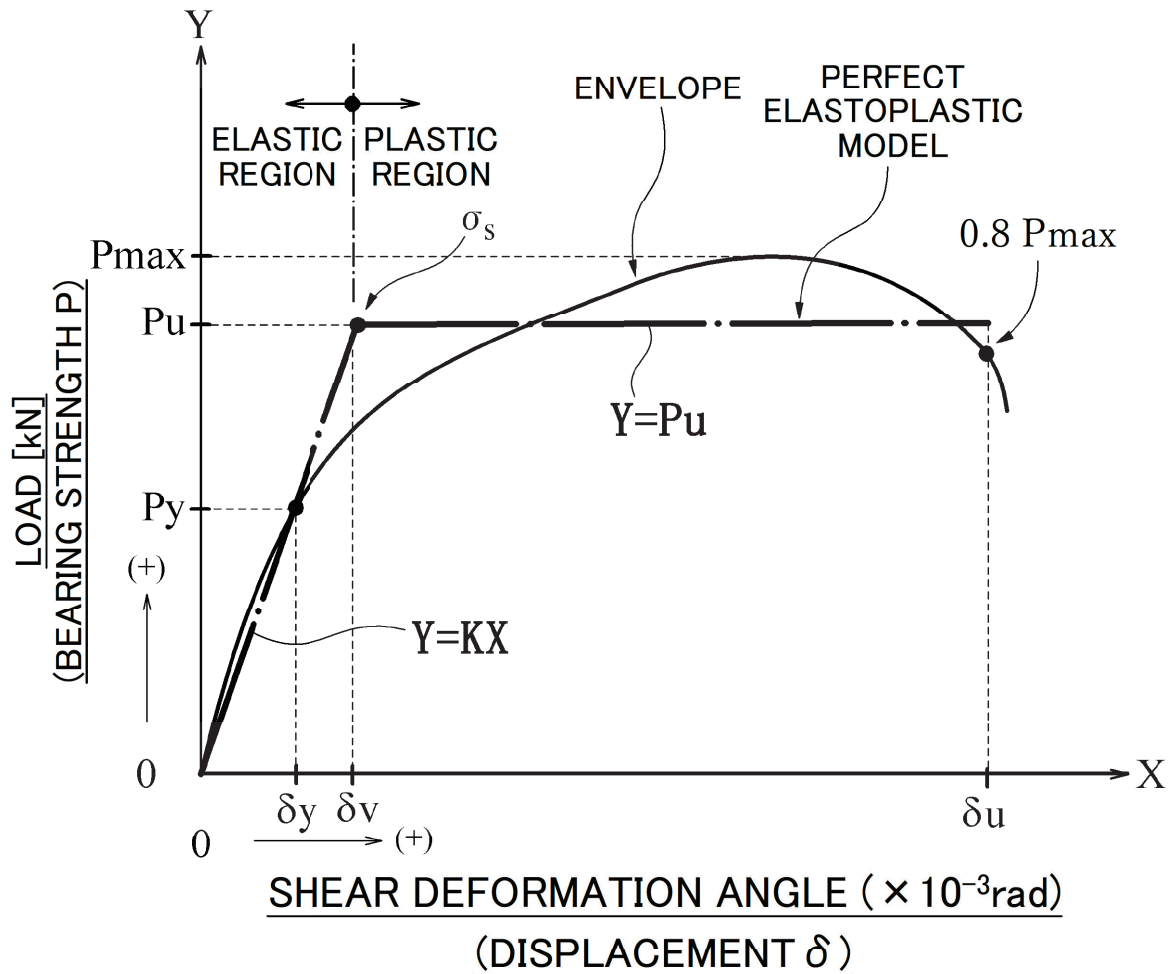
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FIG.2



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FIG.3



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FIG.4



δ_u : ULTIMATE DISPLACEMENT

δ_v : YIELD POINT DISPLACEMENT ($\times 10^{-3} \text{ rad}$)

δ_y : YIELD DISPLACEMENT ($\times 10^{-3} \text{ rad}$)

σ_s : YIELD POINT

K : INITIAL STIFFNESS

μ : DUCTILE FACTOR

P_{max} : MAXIMUM STRENGTH

P_u : ULTIMATE STRENGTH

P_y : YIELD STRENGTH

P_a : SHORT-TERM ALLOWABLE SHEAR STRENGTH

P_0 : SHORT-TERM REFERENCE SHEAR STRENGTH

P_u' : ULTIMATE STRENGTH (CORRECTED VALE)

$P_0 = \beta \times P_y$ ← GYPSUM BOARD FOR STRUCTURE

$P_0 = \beta \times P_u'$ ← LOW-DENSITY GYPSUM-BASED BEARING PANEL

$$P_u' = P_u \times 0.2 \sqrt{2\mu - 1}$$

$$\mu = \frac{\delta_u}{\delta_v}$$

$$P_a = P_0 \times \alpha$$

$$\text{COEFFICIENT OF EFFECTIVE WALL LENGTH} = \frac{P_a}{L \times 1.96 \text{ (kN/m)}}$$

α : REDUCTION COEFFICIENT

β : COEFFICIENT OF VARIATION

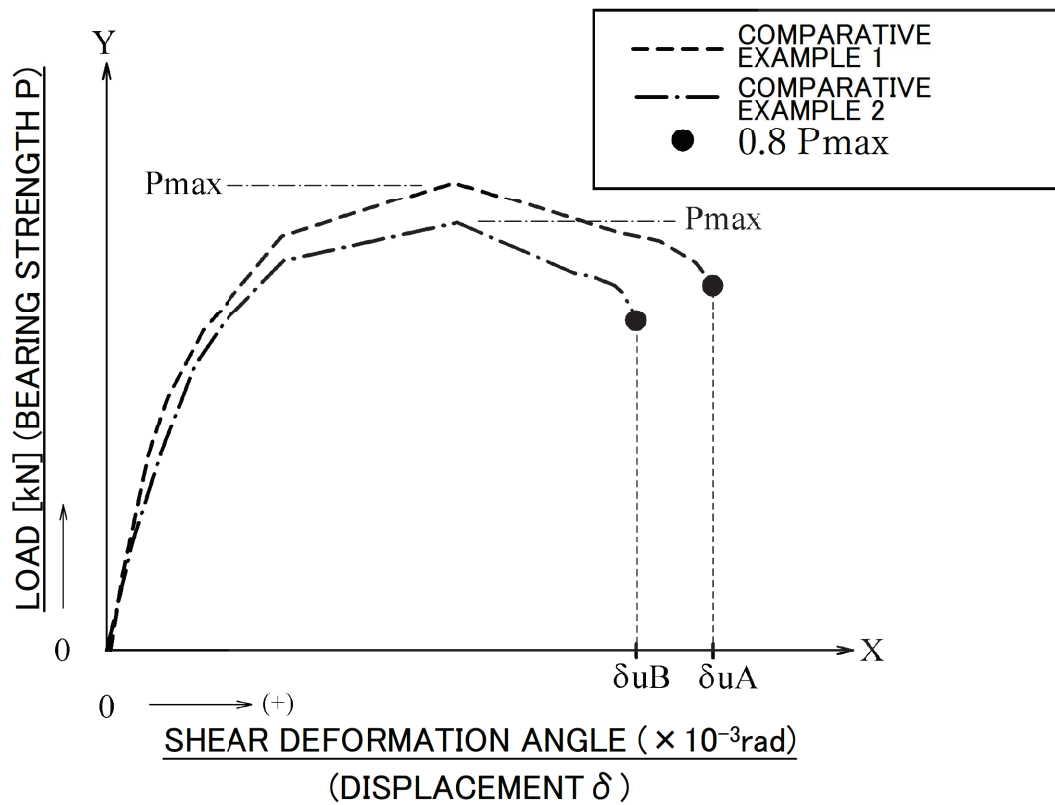
L : LENGTH (m) OF TEST SAMPLE (WALL)

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FIG.5

	NAIL 20	NAIL N1	NAIL N2
HEAD DIAMETER D (mm)	7. 07	6. 62	6. 67
BODY DIAMETER d (mm)	2. 45	2. 83	2. 92
AREA RATIO η (HEAD AREA/BODY CROSS-SECTIONAL AREA)	8. 32	5. 48	5. 20

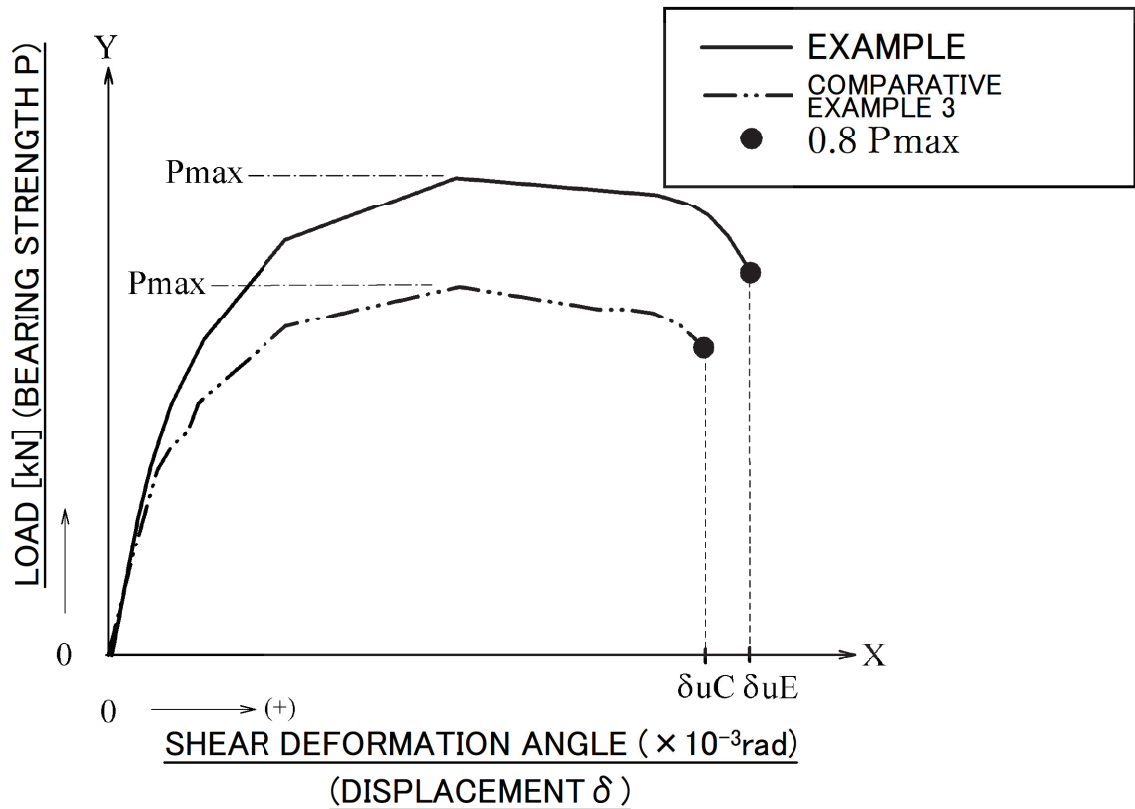
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FIG.6

		COMPARATIVE EXAMPLE 1 (NAIL N1)	COMPARATIVE EXAMPLE 2 (NAIL N2)
EACH DIMENSION OF NAIL (FASTENER)		LENGTH L: ABOUT 50 mm HEAD DIAMETER D: 6.62 mm BODY DIAMETER d: 2.83 mm	LENGTH L: ABOUT 50 mm HEAD DIAMETER D: 6.67 mm BODY DIAMETER d: 2.92 mm
		AREA RATIO η : 5.48	AREA RATIO η : 5.20
PHYSICAL PROPERTIES OF PANEL	AREA DENSITY (kg/m ²)	7.61	7.61
	SPECIFIC GRAVITY	0.78	0.78
	THICKNESS (mm)	9.76	9.76
	COMPRESSIVE STRENGTH (N/mm ²)	11.1	11.1
	LATERAL NAIL RESISTANCE (N)	765	765
COMPOSITION OF REINFORCE- MENT MATERIAL	ORGANIC STRENGTH IMPROVER (MASS PARTS RELATIVE TO CALCINED GYPSUM)	5.5	5.5
	INORGANIC FIBERS (MASS PARTS RELATIVE TO CALCINED GYPSUM)	3.5	3.5
MEASURE- MENT RESULTS OF STRENGTH TEST	INITIAL STIFFNESS K (kN/10 ⁻³ rad)	2.49	2.58
	YIELD POINT DISPLACEMENT δ_v ($\times 10^{-3}$ rad)	6.31	6.69
	ULTIMATE DISPLACEMENT δ_u ($\times 10^{-3}$ rad)	34.9 (δ_{uA})	30.53 (δ_{uB})
	DUCTILE FACTOR μ (δ_u/δ_v)	5.53	4.57
	ULTIMATE STRENGTH (CORRECTED VALUE) P_u' (kN)	11.9	9.83
	ALLOWABLE SHEAR STRENGTH P_a (kN)	8.92	7.37



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FIG.7

		COMPARATIVE EXAMPLE 3 (NAIL N1)	PRESENT INVENTION/ EXAMPLE (NAIL 20)
EACH DIMENSION OF NAIL (FASTENER)		LENGTH L: ABOUT 50 mm HEAD DIAMETER D: 6.62 mm BODY DIAMETER d: 2.83 mm	LENGTH L: ABOUT 50 mm HEAD DIAMETER D: 7.07 mm BODY DIAMETER d: 2.45 mm
		AREA RATIO η : 5.48	AREA RATIO η : 8.32
PHYSICAL PROPERTIES OF PANEL	AREA DENSITY (kg/m ²)	7.2	7.2
	SPECIFIC GRAVITY	0.74	0.74
	THICKNESS (mm)	9.73	9.73
	COMPRESSIVE STRENGTH (N/mm ²)	8.8	8.8
	LATERAL NAIL RESISTANCE (N)	817	817
COMPOSI- TION OF REINFORCE- MENT MATERIAL	ORGANIC STRENGTH IMPROVER (MASS PARTS RELATIVE TO CALCINED GYPSUM)	11.5	11.5
	INORGANIC FIBERS (MASS PARTS RELATIVE TO CALCINED GYPSUM)	4	4
MEASURE- MENT RESULTS OF STRENGTH TEST	INITIAL STIFFNESS K (kN/10 ⁻³ rad)	2.43	2.86
	YIELD POINT DISPLACEMENT $\delta_v (\times 10^{-3}\text{rad})$	6.04	6.83
	ULTIMATE DISPLACEMENT $\delta_u (\times 10^{-3}\text{rad})$	34.98 (δ_{uC})	37.42 (δ_{uE})
	DUCTILE FACTOR $\mu (\delta_u / \delta_v)$	5.78	5.48
	ULTIMATE STRENGTH (CORRECTED VALUE) P_u' (kN)	9.6	12.33
	ALLOWABLE SHEAR STRENGTH P_a (kN)	7.20	9.24



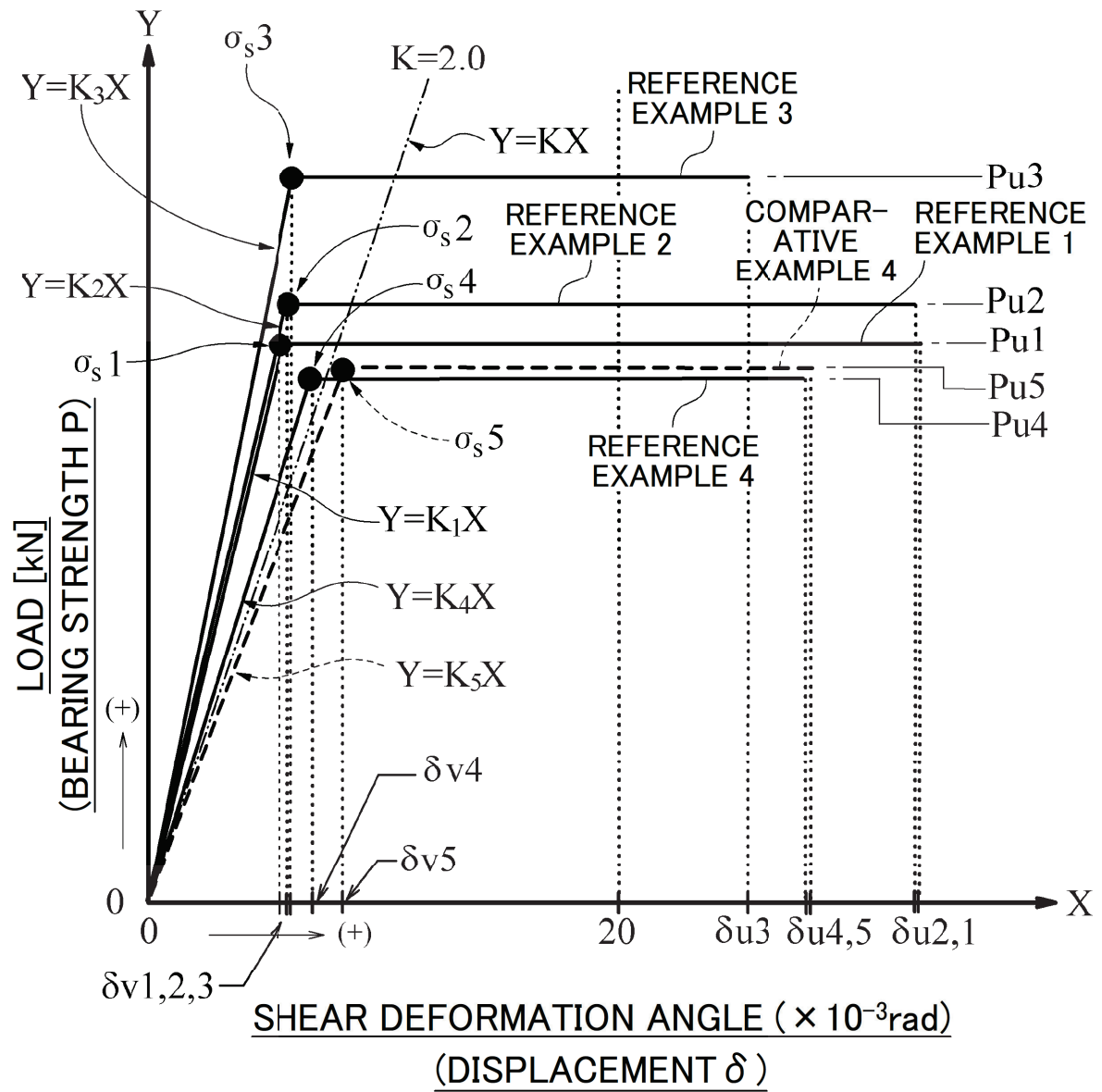
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FIG.8

		REFERENCE EXAMPLE (NAIL N1)				COMPAR- ATIVE EXAMPLE 4 (NAIL N1)
		①	②	③	④	
PHYSICAL PROP- ERTIES	AREA DENSITY (kg/m ²)	7.45	7.61	8.65	8.31	7.80
	SPECIFIC GRAVITY	0.77	0.78	0.89	0.81	0.80
	THICKNESS (mm)	9.68	9.76	9.72	9.75	9.75
	COMPRESSIVE STRENGTH (N/mm ²)	8.4	11.1	9.4	6.5	6.0
	LATERAL NAIL RESISTANCE (N)	516	765	664	640	600
	ORGANIC STRENGTH IMPROVER (MASS PARTS RELATIVE TO CALCINED GYPSUM)	5.5	5.5	5.0	8.0	4.0
	INORGANIC FIBERS (MASS PARTS RELATIVE TO CALCINED GYPSUM)	3.0	3.5	3.0	3.5	3.5
STRENGTH TEST RESULTS	INITIAL STIFFNESS K (kN/10 ⁻³ rad)	2.43	2.49	2.91	2.04	1.94
	YIELD POINT DISPLACEMENT δ_v ($\times 10^{-3}$ rad)	6.04	6.31	6.49	6.80	7.26
	ULTIMATE DISPLACEMENT δ_u ($\times 10^{-3}$ rad)	34.98	34.90	28.09	29.82	30.10
	DUCTILE FACTOR μ (δ_u / δ_v)	5.78	5.53	4.32	4.39	4.15
	ULTIMATE STRENGTH (CORRECTED VALUE) P_u' (kN)	9.60	11.90	10.40	7.80	7.62
	SHORT-TERM ALLOWABLE SHEAR STRENGTH P_a (kN)	7.20	8.92	7.80	5.85	5.72
	WALL MAGNIFICATION*	2.02	2.50	2.19	1.64	1.60

*Assuming that the reduction coefficient α is 0.75 and the coefficient of variation β is 1.0.

$$\begin{aligned}
 &\text{SHORT-TERM REFERENCE SHEAR STRENGTH } P_0 = \beta \times P_u' \\
 &\text{SHORT-TERM ALLOWABLE SHEAR STRENGTH } P_a = P_0 \times \alpha \\
 &\text{COEFFICIENT OF EFFECTIVE WALL LENGTH} = \frac{P_a}{L \times 1.96 \text{ (kN/m)}} \\
 &= \frac{P_a}{1.82\text{m} \times 1.96 \text{ (kN/m)}} = \frac{P_u'}{4.75 \text{ (kN)}}
 \end{aligned}$$

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FIG.9



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FIG.10

