PROJECTS


Australia 108, Australia


Megamall, Romania


Museum of Art, U.S.A.


Little Island Pier55, U.S.A.


Elevated Railway, Japan


Paramount Tower, U.S.A.


National Stadium, Japan


Autzen Stadium, U.S.A.

SPLICE SLEEVE JAPAN, LTD

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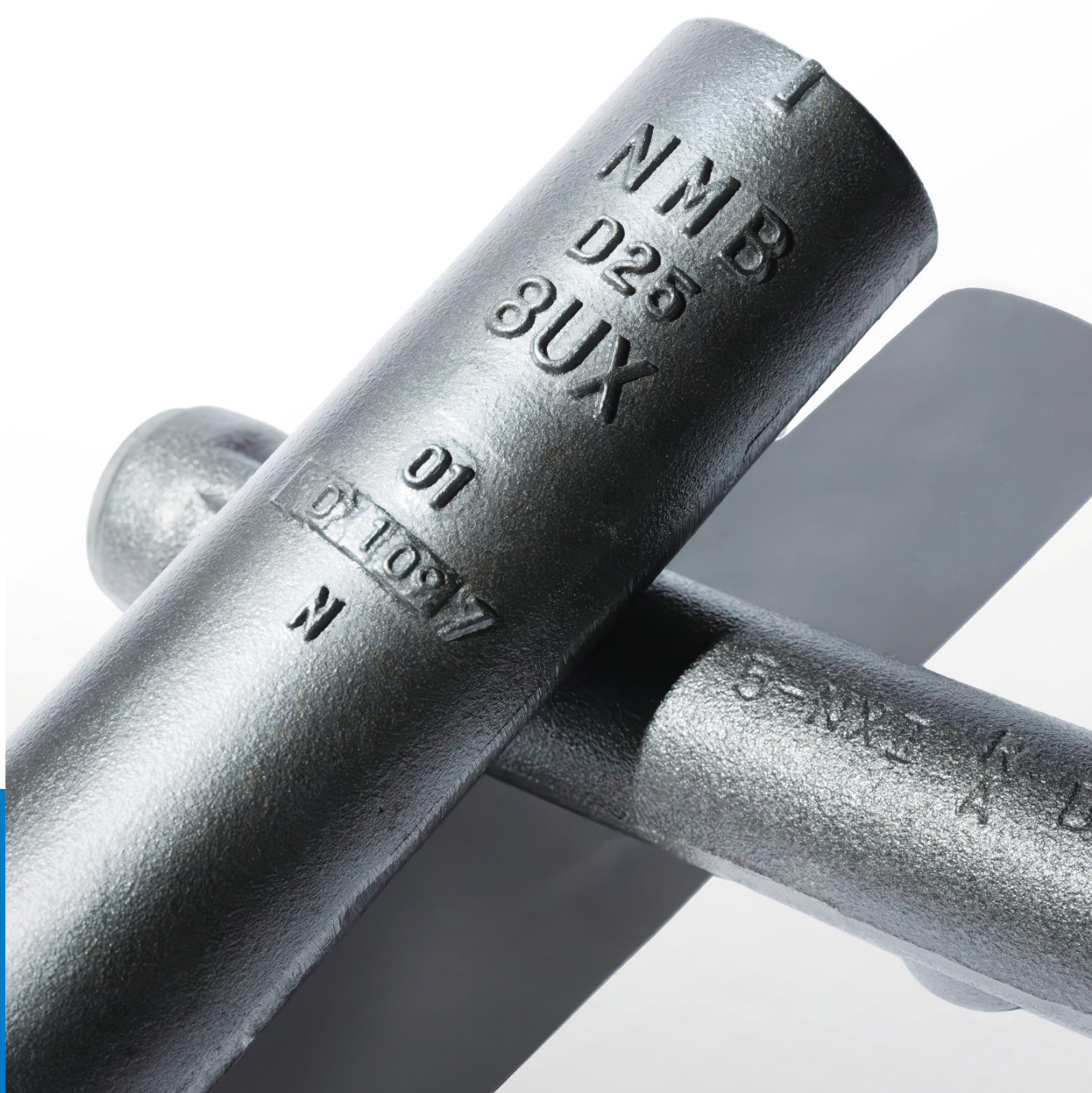
ISO 9001 BUREAU VERITAS Certification

https://www.nmbsplicesleeve.com
Ver. 202410

NMB SPLICE-SLEEVE® SYSTEMS

Your Trusted Rebar Splicing Solution



WE OFFER SIMPLE, SPEEDY, VERSATILE, AND DURABLE CONNECTION.

The original grout-filled mechanical connector approved worldwide.
More than 45 million sleeves used worldwide for over 47 years.
This patented system is a mechanical coupler for splicing reinforcing bars which uses a cylindrical ductile iron casting filled with a Portland cement based non-shrink high early strength grout for precast and cast-in-place concrete construction.

What are the outstanding features of the NMB Splice-Sleeve® Systems?

- Splicing any type of the reinforcing bars.
- No shrinkage, elongation or damage of the reinforcing bar when spliced.
- Accept misaligned reinforcing bars with enough tolerance.
- Special high quality grout is developed by our Splice Sleeve engineers.
- No failures ever reported, used in plastic hinge areas in the highest seismic zones.
- Does not require special skills or certification.

NMB Splice-Sleeve Systems® contributes to the industry in:

High Performance | Speedy Construction | Labor Saving → **Initial Cost Saving**

High quality | Earthquake Resistance | Durability → **Long term cost saving**

→ **Total Cost Saving**

Precast Application

UX (SA) / NX II

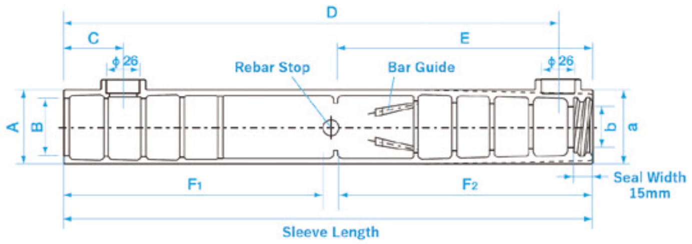
Super UX / NXⅡ can be used in a wide range of construction for structural and civil engineering applications. It is mainly used in precast members as a structural connection as well as in areas such as columns and beams requiring higher strength rebar splices.

Sleeve	Certifications	Rebar size
UX (SA)	ICC-ES Type 1 / 2 / 2HS (USA) Class SA / Class A (Japan) ISO15835 Category S/ B (Romania)	D16 - D41
NX II	Class A (Japan)	D10 - D51

CLASSIFIATION OF REBER SPLICE PERFORMANCE BY BUILDING CENTER OF JAPAN

Class SA connection:
The strength, rigidity and ductility are almost equivalent to those of rebars.

Class A connection:
The strength and rigidity are almost equivalent, but the ductility is slightly inferior to rebars.



Sleeve	Rebar Size *(Applicable)	Sleeve Length (mm)	Sleeve Diameter (mm)			Inlet Port (C) (mm)	Outlet Port (D) (mm)	Rebar Stop (E) (mm)	Bar Embedment (mm)		Usage: Number of Sleeves to be grouted per a bag of	
			O.D. (A, a)	I.D. Wide End (B)	I.D. Narrow End (b)				Wide End (F_1)	Narrow End (F_2)	SS Mortar (15kg)	SSM120N (25kg)
5UX(SA)	D16	245	45	32	22	47	218	115	90 ~ 120	105 ~ 115	29	44
6UX(SA)	D19(D16)	285	49	36	25		258	135	110 ~ 140	125 ~ 135	22	33
7UX(SA)	D22(D16,D19)	325	53	40	29		298	155	130 ~ 160	145 ~ 155	17	25
8UX(SA)	D25(D19,D22)	370	58	44	31		343	175	150 ~ 185	165 ~ 175	13	19
9UX(SA)	D29(D22,D25)	415	63	48	35		388	200	175 ~ 205	190 ~ 200	10	15
10UX(SA)	D32(D25,D29)	455	66	51	39		428	220	195 ~ 225	210 ~ 220	9	14
11UX(SA)	D35(D29,D32)	495	71	55	44		468	240	215 ~ 245	230 ~ 240	7	11
12UX(SA)	D38(D32,D35)	535	77	59	47		508	260	235 ~ 265	250 ~ 260	6	9
13/14UX(SA)	D41(D35,D38)	620	82	62	51		593	300	275 ~ 310	290 ~ 300	4	7
5-NXII	D10,D13(D10)	220	44	32	22	47	193	105	80 ~ 110	95 ~ 105	35	53
6-NXII	D19(D13,D16)	250	48	36	25		223	120	95 ~ 125	110 ~ 120	27	41
7-NXII	D22(D16,D19)	280	52	40	29		253	135	110 ~ 140	125 ~ 135	22	33
8-NXII	D25(D19,D22)	310	56	44	31		283	150	125 ~ 155	140 ~ 150	18	28
9-NXII	D29(D22,D25)	350	60	48	35		323	170	145 ~ 175	160 ~ 170	14	22
10-NXII	D32(D25,D29)	390	64	51	39		363	190	165 ~ 195	180 ~ 190	12	18
11-NXII	D35(D29,D32)	430	69	55	44		403	210	185 ~ 215	200 ~ 210	-	14
12-NXII	D38(D32,D35)	470	75	59	47		443	230	205 ~ 235	220 ~ 230	-	12
13/14-NXII	D41(D35,D38)	520	79	62	51		493	255	230 ~ 260	245 ~ 255	-	10
16-NXII	D51(D38,D41)	620	96	74	62		593	305	280 ~ 310	295 ~ 305	-	6

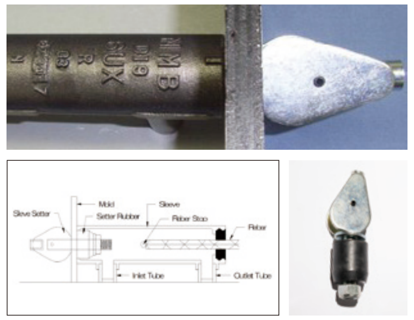
*(　)indicates applicable bar sizes for transition splice

Assembly

The NMB Splice-Sleeve® Systems are specially designed to facilitate construction at the job site, dramatically reduce construction schedule, and achieve strengths greater than that of the lap-spliced reinforcing bars.

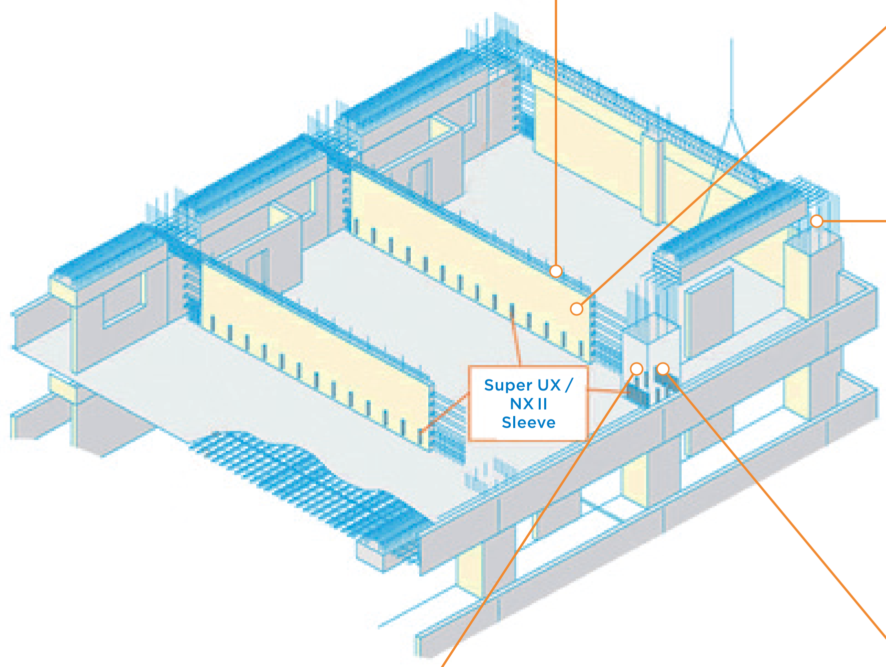
Rebars are inserted into the embedded sleeves, and SS Mortar® grout is quickly injected into the sleeve. This method does not require special skills and makes construction easy, helping to reduce project costs by increasing erection speed.

Sleeve Setter (To hold sleeve in forms)

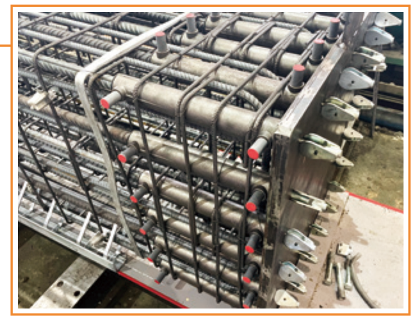


Precast wall production

Precast wall installation

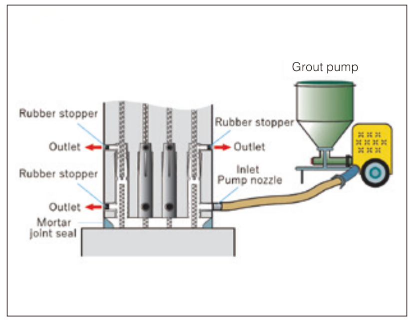


Precast column production



Precast column installation

MASS GROUTING™



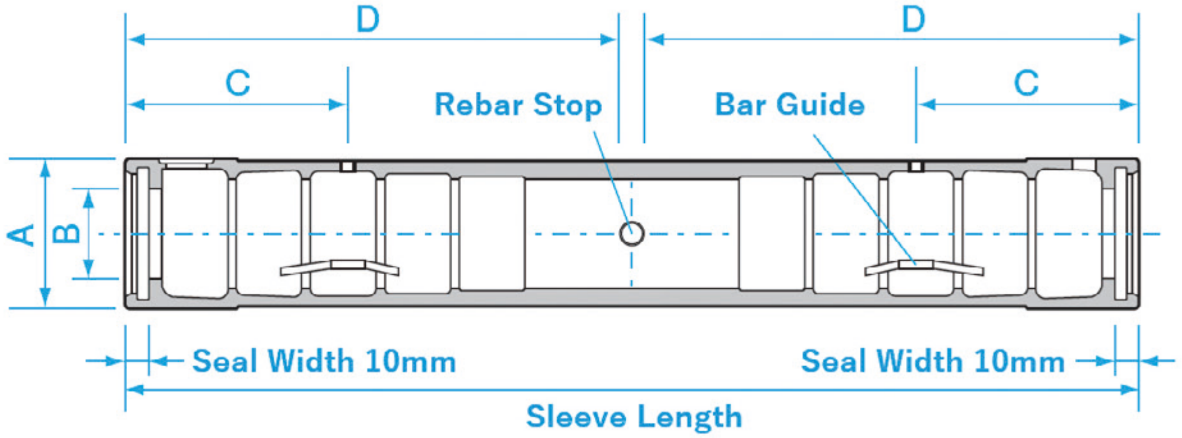
Precast column erection

Cast-in-place Application

Slim-Sleeve®

NMB Slim-Sleeve® is made for reinforcing bars to be spliced at jobsite. Rebars to be spliced are inserted into the sleeve to meet approximately at the center of the sleeve. The interior of the sleeve is filled with SS Mortar® grout. No bar end preparation is necessary, just slide the bar into the sleeve and grout it to complete the connection.

Sleeve	Certifications	Rebar size
Slim-Sleeve®	ICC-ES Type 1 / 2 / 2HS (USA) Class SA / Class A (Japan) ISO15835 Category S/ B (Romania)	D10 - D51



Sleeve	Rebar Size *(Applicable)	Sleeve Length (mm)	Sleeve Diameter (mm)		Set Screw (C) (mm)	Rebar Stop (D) (mm)	Bar Embedment (mm)	Usage: Number of Sleeves to be grouted per a bag of	
			O.D. (A)	I.D. (B)				SS Mortar (15kg)	SSM 120N (25kg)
S5U	D10,D13(D10) D16(D10,D13)	240	37	22	54	115	105～120	53	80
S6U	D19(D13,D16)	270	40	25	54	130	120～135	42	64
S7U	D22(D16,D19)	300	44	28	73	145	135～150	34	51
S8U	D25(D19,D22)	330	48	31	70	160	150～165	31	48
S9U	D29(D22,D25)	370	54	35	75	180	170～185	24	36
S10U	D32(D25,D29)	410	59	39	100	200	190～205	18	27
S11U	D35(D29,D32)	450	65	43	100	220	210～225	14	21
S12U	D38(D32,D35)	490	71	47	100	240	230～245	10	16
S13U	D41(D35,D38)	550	76	51	130	270	260～275	8	12
S16U	D51(D38,D41)	710	92	62	160	350	340～355	5	7

*( )indicates applicable bar sizes for transition splice

Assembly

Horizontal Use

Electing precast beam

Slide the sleeve to one side bar

Slide back to center

Injecting SS Mortar

Vertical Use

Set sleeves in rebar cage

Mixing SS Mortar

Injecting SS Mortar

SS Mortar® and SS Mortar® 120N

SS Mortar® grout is a non-shrink, high early strength cement grout developed only for use with the NMB Splice-Sleeve® Systems. The flowable grout can fill the interior of the sleeve completely. It comes premixed with select blended materials for easy use at the job site.

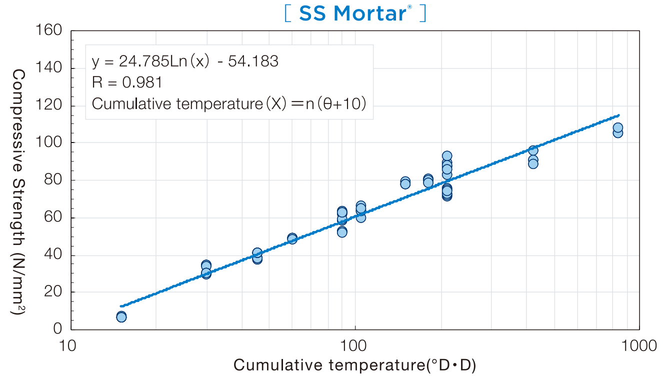
SS Mortar®

Mixing Conditions & Characteristics

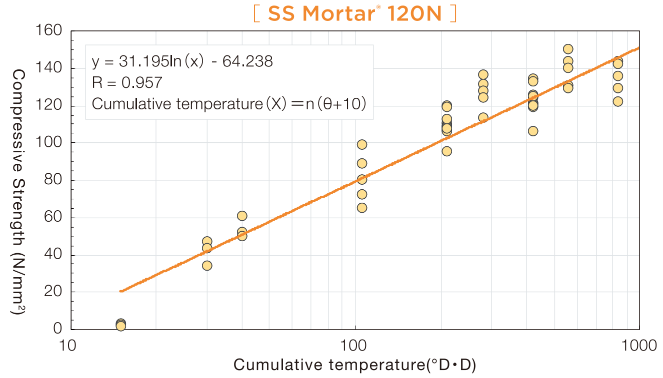
		SS Mortar® (15kg)	SS Mortar® 120N (25kg)
Amount of water/bag		2.1-2.3 Liters (Average 2.2 Liters)	2.65-3.35 Liters (Average 3.0 Liters)
Mixing time		Approximately 2 minutes	
Consistency(Flow Guide Table)		155-235 mm diameter	185-285 mm diameter
Ambient Temperature(℃)		0-60	
Pot Life		Approximately 40 minutes after mixing	Approximately 60 minutes after mixing
Compressive Strength	Cylinder shaped mold	More than 70 N/mm²	More than 100 N/mm²
	Cubic mold	More than 77 N/mm²	More than 107 N/mm²

Cumulative Temp & Compressive Strength

[SS Mortar®]



[SS Mortar® 120N]



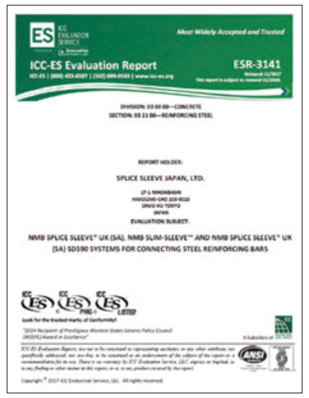
SS Mortar® 120N

Example of a test results on SS Mortar® and SS Mortar® 120N

Type	Amount of water (per bag)	Curing Temp. (Celsius)	Setting Time (hour - min.) Initial	Setting Time (hour - min.) Final	Compressive Strength (N/mm²) 1 day	3 day	7 day	28 day
SS Mortar®	2.2 liters per bag (15kg/bag)	5	9-31	13-35	10.1	42.2	56.5	86.3
		20	4-18	5-55	30.5	55.2	71.1	100
		30	2-23	3-20	49.0	68.5	79.1	101
SS Mortar® 120N	3.0 liters per bag (25kg/bag)	5	9-55	15-00	4.62	39.0	107	129
		20	7-00	8-25	37.8	82.7	112	136
		30	6-05	7-00	60.4	93.4	128	144

Technical Data

Certifications



Class SA requirements

Test method and loading rules

Static tension test	0 → 0.95σ_{y0} → 0.02σ_{y0} → failure
Repeated tension test	0 → (0.02σ_{y0} ↔ 0.95σ_{y0}) 30 times → failure
Elastic reversed cyclic test	0 → (0.95σ_{y0} ↔ -0.5σ_{y0}) 20 times → failure
Plastic reversed cyclic test	(2ε_y ↔ -0.5σ_{y0}) 4 times → failure (5ε_y ↔ -0.5σ_{y0}) 4 times → failure
Static Compression test	(Not required)

σ_{y0}:rebar's specified yield strength　ε_y:yield strain of spliced bar

Tension and compression strength

Static tension test	$\sigma_b \geqq 1.35\sigma_{y0}$ or $\sigma_b \geqq \sigma_{b0}$
Repeated tension test	$\sigma_b \geqq 1.35\sigma_{y0}$ or $\sigma_b \geqq \sigma_{b0}$
Elastic/plastic reversed cyclic test	$\sigma_b \geqq 1.35\sigma_{y0}$ or $\sigma_b \geqq \sigma_{b0}$
Static Compression test	(Not required)

σ_b:tensile strength of spliced bar　σ_{b0}:rebar's specified tensile strength
σ_{y0}:rebar's specified yield strength

Rigidity

Static tension test	$0.7\sigma_{y0}E \geqq E_0$ $0.95\sigma_{y0}E \geqq 0.9E_0$
Repeated tension test	${}_{30c}E \geqq 0.85\,{}_{1c}E$
Elastic reversed cyclic test	${}_{20c}E \geqq 0.5\,{}_{1c}E$

E_0:rebar's Young's modulus
E:rebar's secant modulus
${}_{1c}E$, ${}_{30c}E$:rebar's secant modulus at stresses of 0.95σ_{y0} at 1st or 30th loading.
${}_{1c}E$, ${}_{20c}E$:rebar's secant modulus at stresses of 0.95σ_{y0} at 1st or 20th loading
σ_{y0}:rebar's specified yield strength

Slip

Static tension test	$\delta_s \leqq 0.3$mm
Repeated tension test	${}_{30c}\delta_s \leqq 0.3$mm
Elastic reversed cyclic test	${}_{20c}\delta_s \leqq 0.3$mm
Plastic reversed cyclic test	${}_{4c}\varepsilon_s \leqq 0.5\varepsilon_y$ & ${}_{4c}\delta_s \leqq 0.3$mm & ${}_{8c}\varepsilon_s \leqq 1.5\varepsilon_y$ & ${}_{8c}\delta_s \leqq 0.9$mm

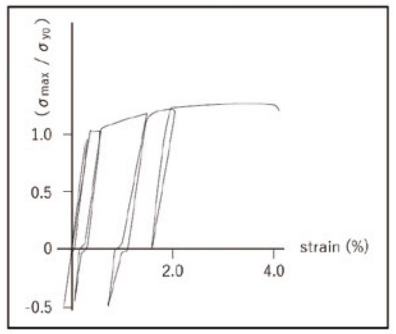
ε_s:slip strain of spliced bar　ε_y:actual yield strain of spliced bar
δ_s:slip deformation of spliced bar　σ_{y0}:rebar's specified yield strength

Ductility

Static tension test	$\varepsilon_u \geqq 20\varepsilon_y$ & $\varepsilon_u \geqq 0.04$
Repeated tension test	$\varepsilon_u \geqq 20\varepsilon_y$ & $\varepsilon_u \geqq 0.04$

ε_u:ultimate strain of spliced bar　ε_y:yield strain of spliced bar

Test machines in our laboratory



Elastic/plastic reversed cyclic test (SD490 D41)

Fatigue Resistance Test

The fatigue resistance of splices with 2 million-stress cycles provides approximately 18kgf/mm² (minimum stress. min.=1.97kgf/mm²), which is 80 % of the strength of un-spliced rebar with 2 million-stress cycles.

Fire resistant performance

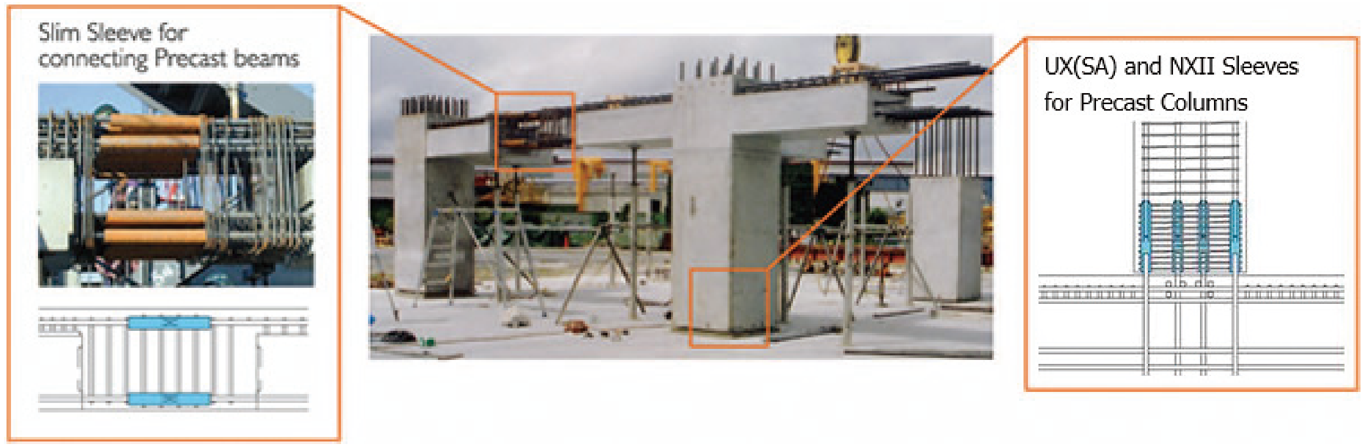
1. No deterioration of the splicing performance was observed after the fire exposure, reaching up to 400°C on NMB Splice Sleeves not cast in concrete.
2. No deterioration of the splicing performance with 20mm concrete cover for 3 hours fire exposure at 1,200°C.

Building Application

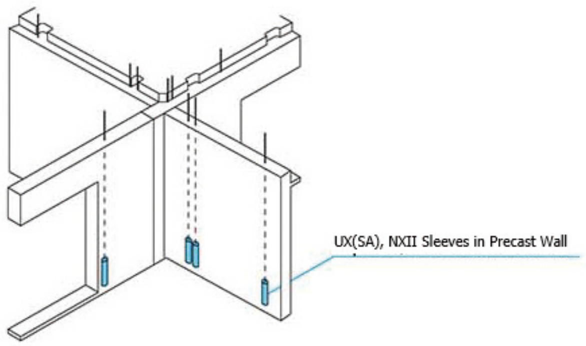
Exhibits high performance when used in integral structural members such as columns, beams, and walls.

The coupler's superiority shows earthquake resistance and ease of construction. NMB Splice-Sleeve® Systems are widely used for connecting reinforcing bars in high-rise buildings, especially in earthquake-prone countries, like Japan.
Connect column, beam, wall, and other essential structural components for Super High-Rise Buildings.

Precast column and cast-in-place beam closure pour.

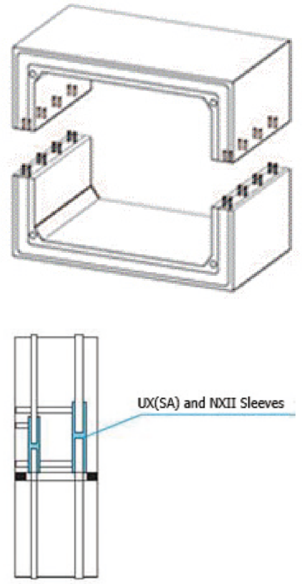


Precast Wall



Civil Engineering Precast Box Culvert

Box Calvert



Civil Engineering Cast-in-Place

RC Piles

Caisson Foundation

Beam Foundation