



TOTAL PRECAST SOLUTION:

Grouted Mechanical Couplers
Grouting Services
Precast Lifters and Connectors
Consultation Services

CONCRETE SOLUTIONS. BETTER CONSTRUCTION.



For Precast and Cast-In-Place Connections

- Used Worldwide for almost 50 years
- First and only SA Class mechanical grouted coupler approved by BCJ
 - SA Class \geq Type 2
- More than 40 million sleeves sold worldwide
- Only grouted mechanical coupler that has proven superb seismic performance
 - Guam on 1993: Magnitude 8.2
 - Kobe Earthquake on 1995: Magnitude 7.2
 - Tohoku Area in Japan: Magnitude 9.0



Current Projects



URBAN DECA ORTIGAS

- 22 Bldg. Mass Housing Project in Ortigas Extension
- First project to have GPBS' Grouting Supervision to ensure the quality of Grout and ensure compliance on NMB System procedures



ATHLETE'S VILLAGE:

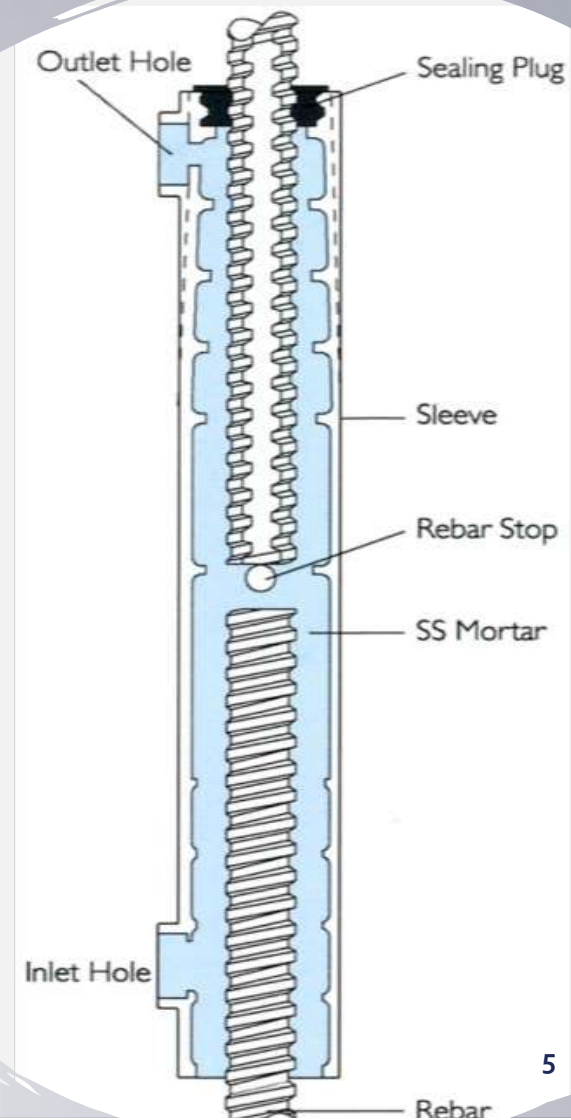
- Athlete's Dormitory for the 2019 SEA Games in New Clark City



NMB Splice Sleeve

GENERAL
INFORMATION

Sleeves and Accessories



SS Mortar:

Pot Life: 40 Minutes

Mixing Time: 2
Minutes

Shelf Life: 1 Year from
Manufacturing Date

Example of the test result for hardened SS Mortar

Consistency (Flow table)	Curing temp	Compressive Strength (N/mm ²)					
		12 hours	18 hours	1 day	3 day	7 day	28 day
180 mm	5℃	—	4.0	10.1	42.2	56.5	86.3
	20℃	5.6	20.2	30.5	55.2	71.1	100
	30℃	18.5	36.0	49.0	68.5	79.1	101

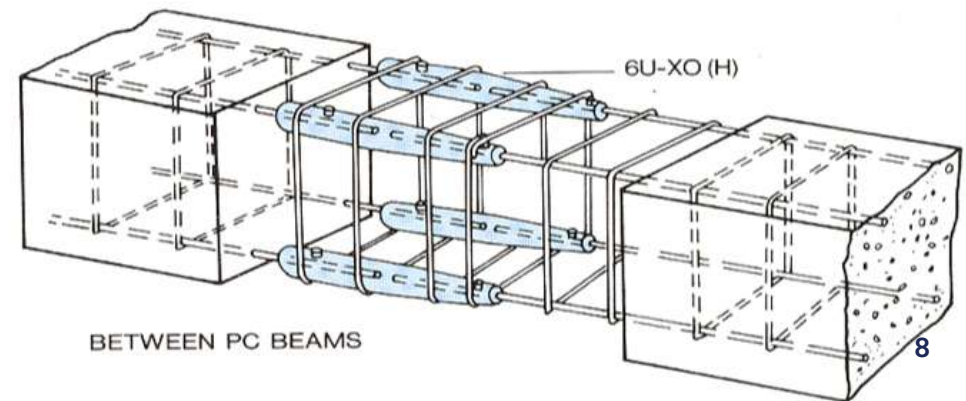
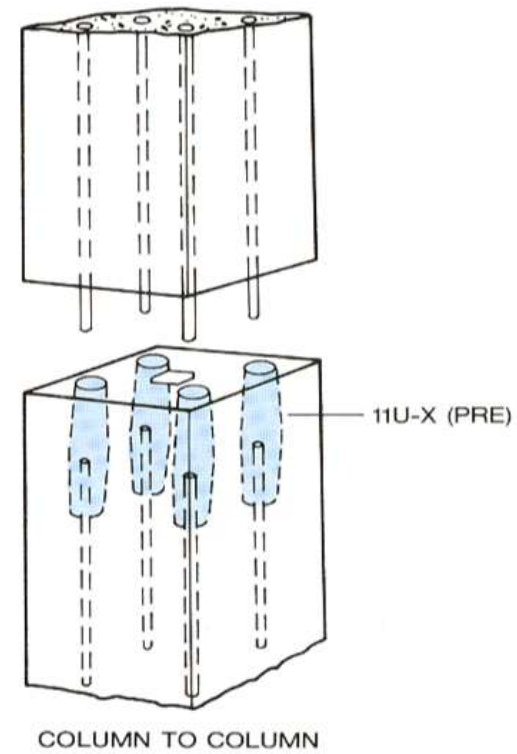
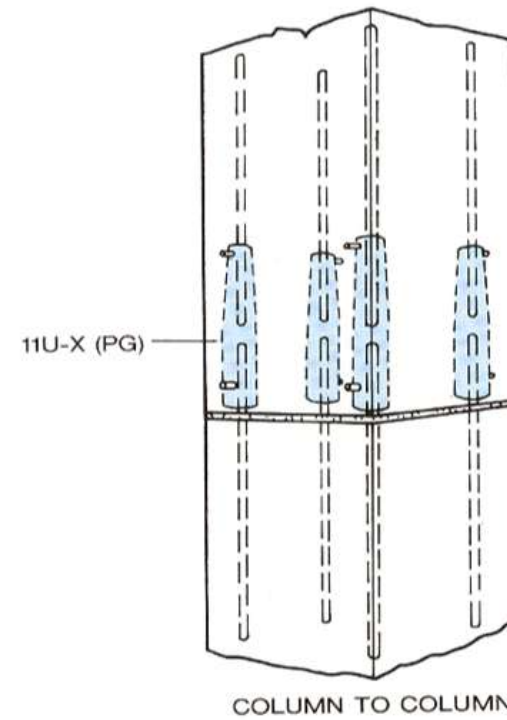
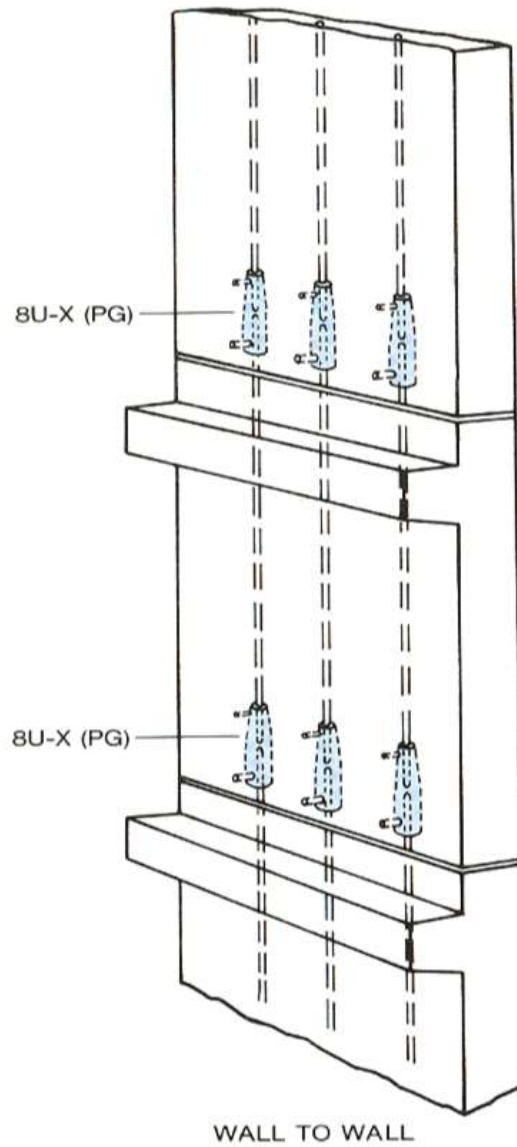


Sleeve	Rebar Size (JIS)	Sleeve Length (mm)	Sleeve Diameter (mm)			Inlet Position (mm) (C)	Outlet Position (D) (mm)	Rebar Stop (E) (mm)	Rebar Embedment (mm)		Grout Consumption (pcs/15 kg bag)
			O.D.(A ₂) (mm)	I. D.					Wide End (F ₁)	Narrow End (F ₂)	
				Wide End(B)	Narrow End(b)						
5UX(SA)	D16	245	45	32	22	47	218	115	90~120	105~115	29
6UX(SA)	D19 *(D16)	285	49	36	25		258	135	110~140	125~135	22
7UX(SA)	D22 *(D16~D19)	325	53	40	29		298	155	130~160	145~155	17
8UX(SA)	D25 *(D19~D22)	370	58	44	31		343	175	150~185	165~175	13
9UX(SA)	D29 *(D22~D25)	415	63	48	35		388	200	175~205	190~200	10
10UX(SA)	D32 *(D25~D29)	455	66	51	39		428	220	195~225	210~220	9
11UX(SA)	D35 *(D29~D32)	495	71	55	44		468	240	215~245	230~240	7
12UX(SA)	D38 *(D32~D35)	535	77	59	47		508	260	235~265	250~260	6
13/14UX(SA)	D41 *(D35~D38)	620	82	62	51		593	300	275~310	290~300	4
5-NXII	D16	220	44	32	22	47	193	105	80~110	95~105	35
6-NXII	D19 *(D16)	250	48	36	25		223	120	95~125	110~120	27
7-NXII	D22 *(D16~D19)	280	52	40	29		253	135	110~140	125~135	22

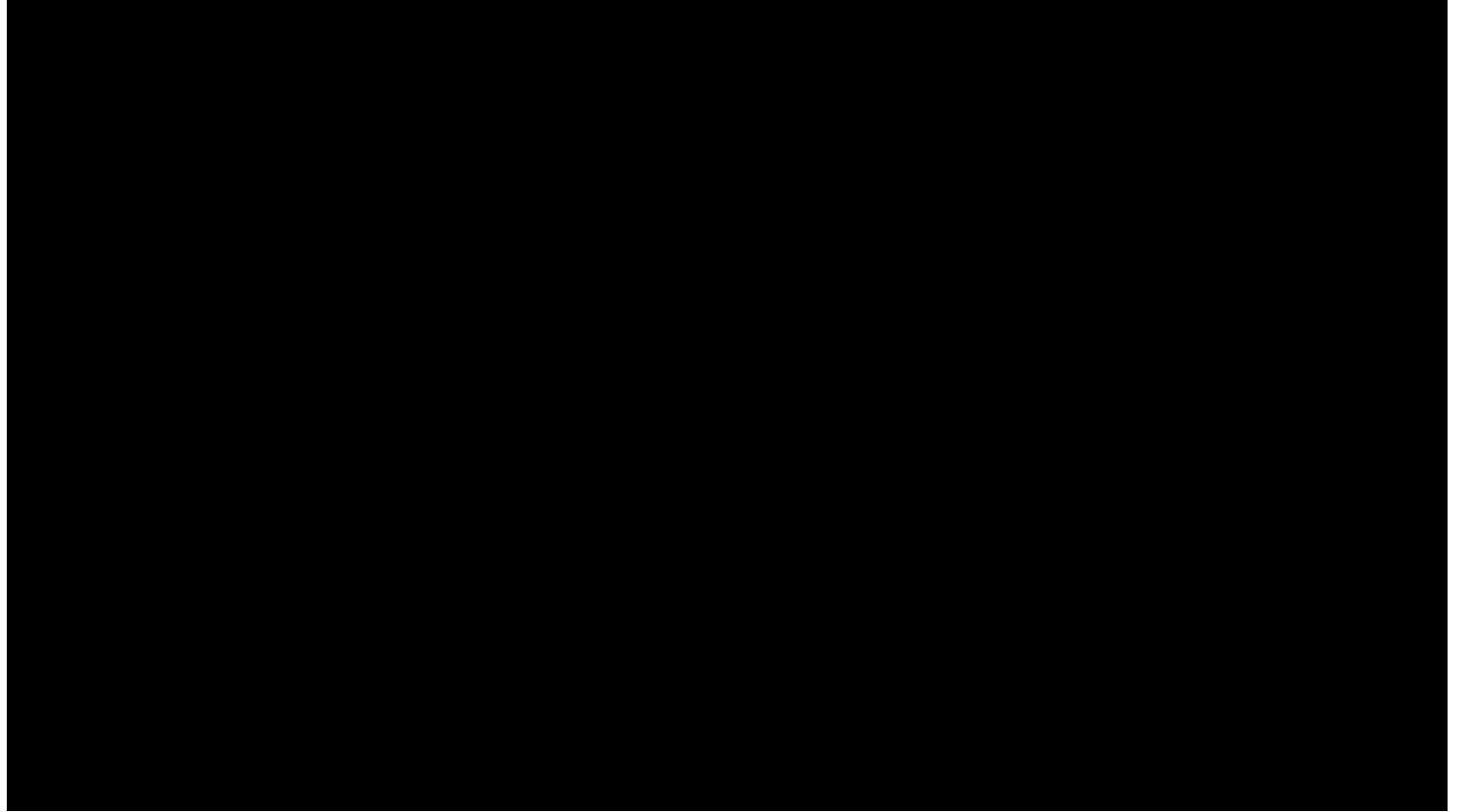
*() indicates transition splice

NMB Splice Sleeve Specifications

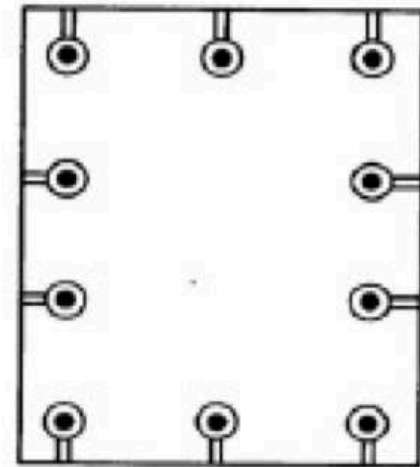
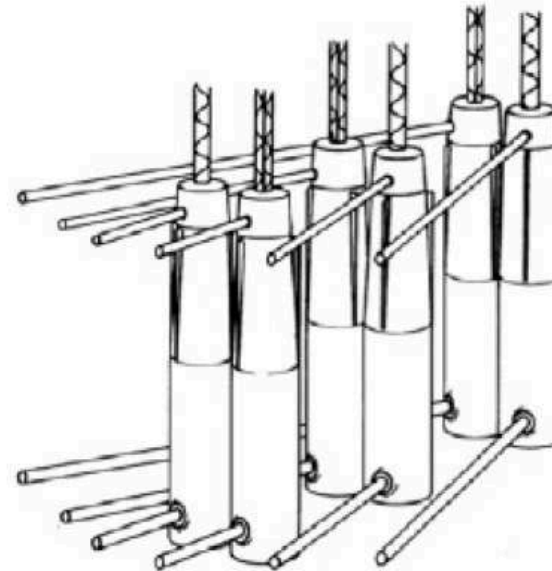
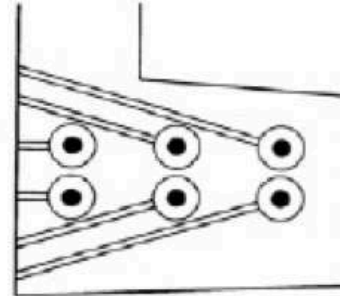
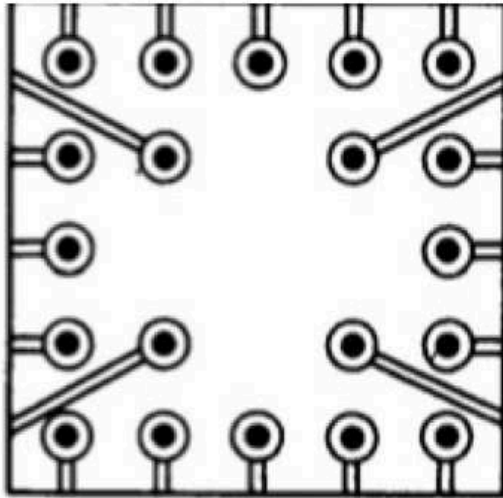
Application Samples



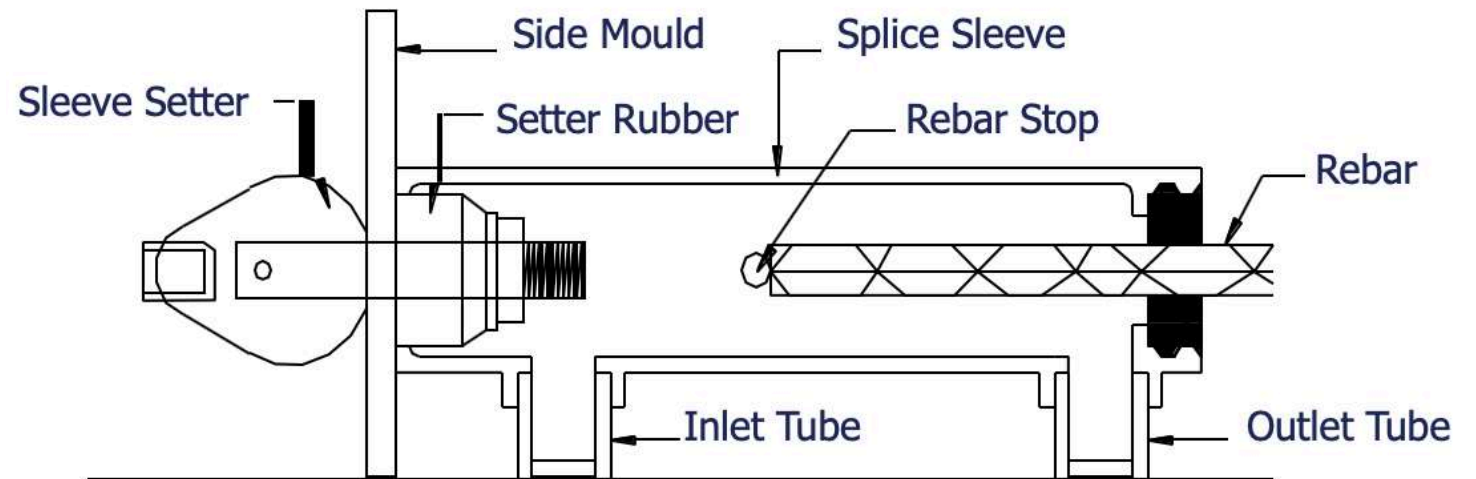
PLANT OPERATION



Examples
of PVC
Grout Tube
Installations

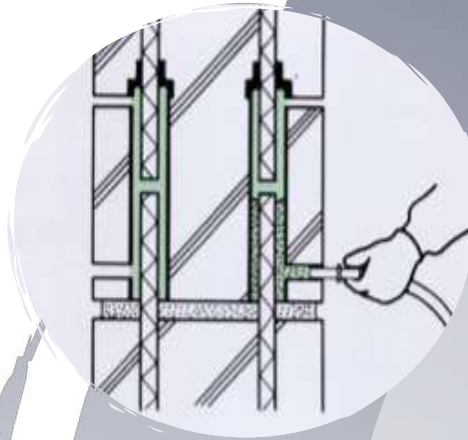


Sleeve Assembly at Precast Plant

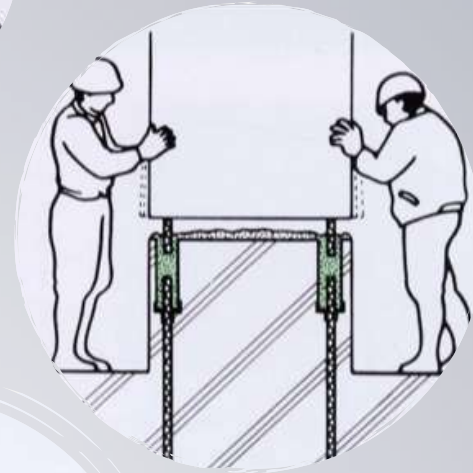


Field
Operation

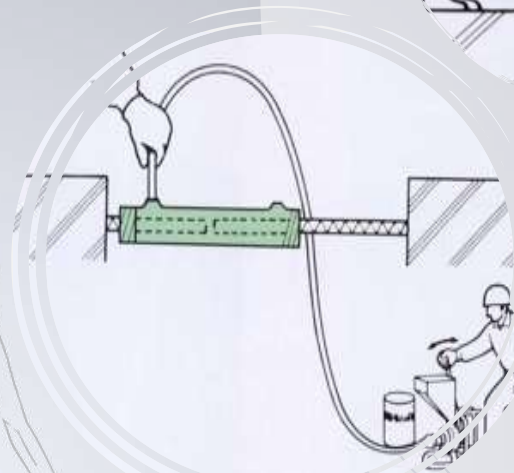
Grouting Methods



Post Grouting

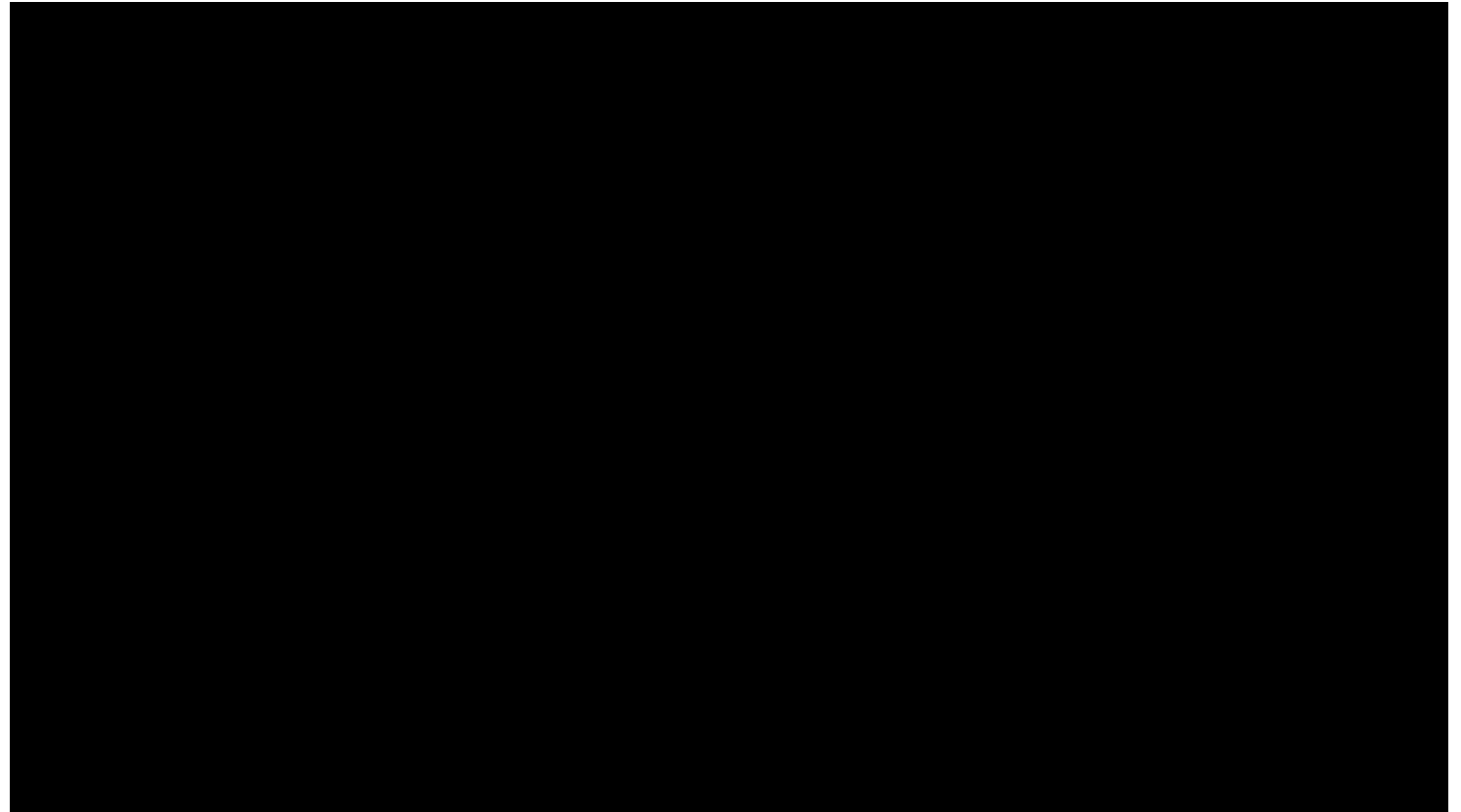


Pre - Grouting



Horizontal Grouting

Column Erection and Mass Grouting





NMB SPLICE SLEEVE SEISMIC PERFORMANCE

Kobe
Earthquake
1995
Magnitude
7.2



NMB Projects in the Kobe Area during the M7.2 Earthquake



- A total of 148 blocks of precast concrete buildings using NMB Splice Sleeves were hit by this earthquake, but remained undamaged, saving the lives of approximately 5,000 residents despite surrounding buildings which had totally collapsed or suffered severe damage.

Construction
Site using
NMB before
being hit by a
Tsunami



128'
Tsunami
hitting the
site and the
Ofunato
Fish Market



Construction Site surviving after the Tsunami while the nearby market was washed off



A large, stylized graphic of a globe is positioned on the right side of the image. The globe is rendered in a light blue-grey color with visible latitude and longitude lines, set against a dark blue background. The text is placed to the right of the globe's center.

NIMB SPLICESLEEVE
PROJECTS
WORLDWIDE

Australia 108

108 Floors of
Total Precast
Structure



Musashi Kosugi Twin Towers

59 and 47
Storeys
Constructed
from 2005-
2009



Shiodome H Block

56 Storeys
Constructed from
2000-2004



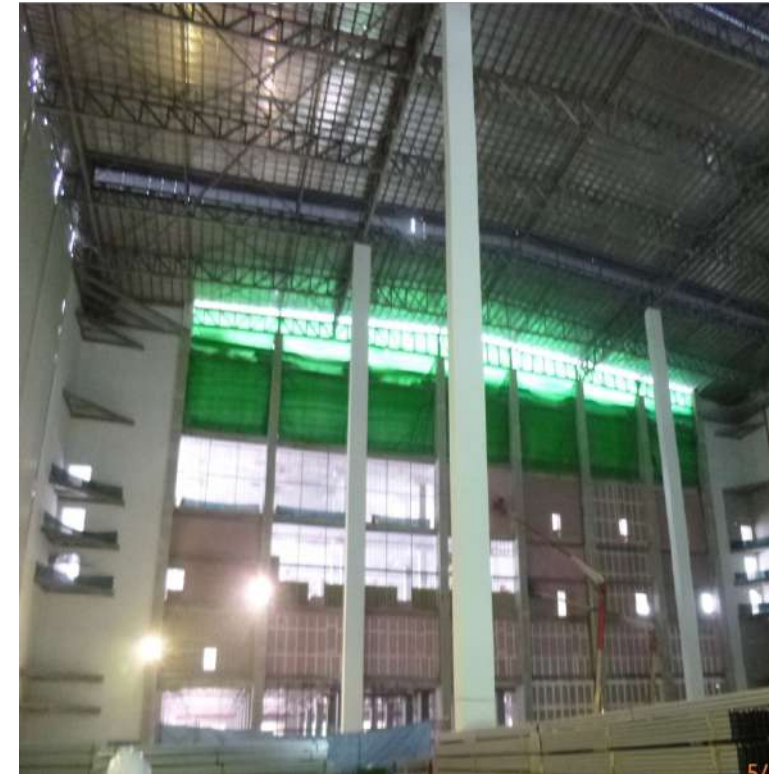
Capital Green

40 Storeys
242 meters
height



NTUC Warehouse

50 meter high
stand-alone
column





NMB SPLICE SLEEVE CERTIFICATIONS AND TEST RESULTS

Sy² + Associates Evaluation Report using PH Rebar



The NMB Splice-Sleeve[®] System
Evaluation and Certification Report

CERTIFICATION

This is to certify that **SY² + Associates, Inc.**, a structural engineering consultancy firm, undertook the structural evaluation of the **NMB Splice-Sleeve System** in behalf of **Makati Development Corporation**.

This is to certify, further, that the undersigned supervised the said evaluation.

Based on the test results submitted by Splice Sleeve Japan, the material strength properties of NMB Splice-Sleeve System for both Type 1 and Type 2 mechanical coupler systems are in compliance with all the applicable provisions of the local code (the National Structural Code of the Philippines (NSCP), 2010 Edition), as well as the internationally-accepted structural codes and standards (International Building Code (IBC), 2012 Edition). The NMB Splice Sleeve grout-filled System tests conducted were all using locally sourced Reinforcement Steel Bars in the Philippines.

Moreover, the said grout-filled mechanical connection can also be used as an alternative connection for precast components in lieu of standard tension splices for cast in place construction.

It is therefore, the professional judgement and opinion of the undersigned that the use of the NMB Splice-Sleeve System, as mechanical coupling system, is structurally adequate and acceptable.

This certification is being issued upon the request of the Owners for whatever legal purpose it may serve.

By:


JOSE A. SY
Civil-Structural Engineer
Reg. No. 22404

July 2016

SY² + ASSOCIATES, INC.

ICC ESR-3141
ICC ESR-3143
ICC ESR-5645

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ICC-ES Report

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ESR-3141

Valid 11/14 to 11/15

DIVISION: 03 00 00—CONCRETE

SECTION: 03 21 00—REINFORCING STEEL

REPORT HOLDER:

SPLICE SLEEVE JAPAN, LTD.

3-7-1 NINONBASHI
NARIZOIC-CHO, 103-0015
CHUO-KU TOKYO

EVALUATION SUBJECT:

NMB SPLICE SLEEVE® UX (SA), NMB SLIM-SLEEVE™ AND NMB SPLICE SLEEVE® UX (SA) SCS590 SYSTEMS FOR CONNECTING STEEL REINFORCING BARS

Look for the trusted marks of Conformity!

"2014 Recipient of Prestigious Western States Science Policy Council (WSSPC) Award in Excellence"

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ICC-ES Evaluation Report

Issued February 1, 2014

This report is subject to renewal February 1, 2015.

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ESR-3433

DIVISION: 03 00 00—CONCRETE

SECTION: 03 21 00—REINFORCING STEEL

REPORT HOLDER:

SPLICE SLEEVE NORTH AMERICA, INC.
3677 WEST 536 MILL ROAD, SUITE 200
LIVONIA, MICHIGAN 48150
(734) 839-6426
www.splicesleeve.com

EVALUATION SUBJECT:

NMB SPLICE-SLEEVE® TYPE UX, SNX11 AND A11W SYSTEMS FOR CONNECTING STEEL REINFORCING BARS

1.0 EVALUATION SCOPE

Compliance with the following codes:

2012 and 2006 International Building Code® (IBC)

Properties evaluated:

STRUCTURAL

2.0 USES

The Splice Sleeve North America, Inc. (SSNA), NMB Splice-Sleeve Type UX, SNX11 and A11W systems are used as mechanical splices of deformed steel reinforcing bars in reinforced concrete construction. The NMB Splice-Sleeve Type UX, SNX11 and A11W systems comply with Section 12.14.3.2 of ACI 318-11 for the 2012 IBC (ACI 318-08 for the 2006 IBC) (ACI 318-05 as referenced in Section 1903.2 of the IBC) for use as tension and compression mechanical connections of deformed steel reinforcing bars. The NMB Splice-Sleeve Type UX, SNX11 and A11W connectors are used with S5 Mortar to splice ASTM A615 Grade 60, or ASTM A615 Grade 63, deformed bars, forming NMB Splice-Sleeve Type UX, SNX11 and A11W systems, respectively. The NMB Splice-Sleeve Type UX, SNX11 and A11W systems also comply with the Type 2 mechanical splice requirements of Section 21.1.6.1 of ACI 318-11 for the 2012 IBC (ACI 318-08 for the 2006 IBC), and are for use where Type 1 or Type 2 mechanical splices are specified by the IBC and ACI 318.

3.0 DESCRIPTION

3.1 NMB Splice-Sleeve Type UX Connectors:

The Type UX NMB Splice-Sleeve connectors consist of half-straight and half-lapped steel cylinders, with multiple internal ridges. The Type UX NMB Splice-Sleeve connector consists of a straight steel cylinder with multiple internal ridges, and is used to splice uncased, No. 11 deformed steel reinforcing bars. The midsection of the interior of the sleeve is provided with a rebar stop that establishes the proper embedment length of the reinforcing bars. As an optional feature, the sleeves are also available with a set screw located on the side of the narrow end of the sleeve. The set screw temporarily attaches the sleeve to the rebar inserted in the narrow end of the sleeve prior to the installation of the grout. The sleeve is an iron casting conforming to a proprietary specification, which is based on ASTM A536 64 (2009), with a Grade of 85-60-08 (minimum yield and tensile strengths of 60,000 and 85,000 psi (414 and 588 MPa), respectively) for all sleeve sizes greater than No. 6, and a Grade of 65-45-12 (minimum yield and tensile strengths of 40,000 and 65,000 psi (276 and 448 MPa), respectively) for 5/8" and 3/4" sleeves. The NMB Splice-Sleeve Type UX connector configuration, dimensions, and the required rebar embedment lengths are provided in Figure 1 and Table 1.

3.2 NMB Splice-Sleeve SNX11 Connector:

The NMB Splice-Sleeve SNX11 connector consists of a straight steel cylinder with multiple internal ridges, and is used to splice uncased, No. 11 deformed steel reinforcing bars. The midsection of the interior of the sleeve is provided with a rebar stop that establishes the proper embedment length of the reinforcing bars. As an optional feature, the sleeves are also available with a set screw located on the side of the narrow end of the sleeve. The set screw is used to provide temporary attachment of the sleeve to the rebar inserted in the narrow end of the sleeve prior to the installation of the grout. The sleeve is an iron casting conforming to a proprietary specification, which is based on ASTM A536 64 (2009), with a Grade of 85-60-08 (minimum yield and tensile strengths of 60,000 and 85,000 psi (414 and 588 MPa), respectively) for all sleeve sizes greater than No. 6, and Grade 65-45-12 (minimum yield and tensile strengths of 40,000 and 65,000 psi (276 and 448 MPa), respectively) for sleeve sizes No. 6 and below. The Type UX sleeves are furnished in sizes set forth in Table 1. The Type UX sleeves comply as tension or compression splices for deformed reinforcing bars as specified in Section 12.14.3.2 of the IBC and Section 21.6.1 of ACI 318-11 as referenced in 2006 International Building Code® (IBC) Section 1903 and 2006 International Residential Code® (IRC) Section 1803. The sleeves also comply with the Type 2 mechanical splice requirements of Section 21.6.1.2 of the IBC and Section 21.6.1.1 of ACI 318-11 for all sizes of the Type UX sleeve, except for the 1/2" UX sleeve. The sleeves are used to splice

internal ridges. The Type UX NMB Splice-Sleeve connectors have two unequal inside-diameter and unequal outside-diameter ends (wide end and narrow end), and are used to splice two uncased, equal-diameter, deformed steel reinforcing bars. The midsection of the interior of the sleeve is provided with a rebar stop that establishes the proper embedment length of the reinforcing bars. As an optional feature, the sleeves are also available with a set screw located on the side of the narrow end of the sleeve. The set screw temporarily attaches the sleeve to the rebar inserted in the narrow end of the sleeve prior to the installation of the grout.

The Type UX sleeves are iron castings conforming to a proprietary specification, which is based on ASTM A536 64 (2009), with a Grade of 85-60-08 (minimum yield and tensile strengths of 60,000 and 85,000 psi (414 and 588 MPa), respectively) for all sleeve sizes greater than No. 6, and a Grade of 65-45-12 (minimum yield and tensile strengths of 40,000 and 65,000 psi (276 and 448 MPa), respectively) for 5/8" and 3/4" sleeves. The NMB Splice-Sleeve Type UX connector configuration, dimensions, and the required rebar embedment lengths are provided in Figure 1 and Table 1.

3.3 NMB Splice-Sleeve A11W Connector:

The A11W NMB Splice-Sleeve connector consists of a straight steel cylinder with multiple internal ridges. The A11W NMB Splice-Sleeve connector has two unequal inside-diameter ends, and is used to splice uncased, No. 11 deformed steel reinforcing bars. The midsection of the interior of the sleeve is provided with a rebar stop that

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ESR-5645

DIVISION: 03 00 00—CONCRETE

SECTION: 03210—Reinforcing Steel

NMB SPLICE-SLEEVES

SPLICE SLEEVE NORTH AMERICA, INC.
3677 WEST 536 MILL ROAD, SUITE 100
LIVONIA, MICHIGAN 48150

1.0 SUBJECT

NMB Splice-Sleeve®

2.0 DESCRIPTION

2.1 General:

The NMB Splice-Sleeves are used as mechanical splices of deformed rebar in concrete construction. The three types of sleeves available are Type UX, Type U and Type SUX. The sleeves are used with S5 Mortar as specified in Section 2.2.4.

2.2 Materials:

2.2.1 NMB Splice-Sleeve Type UX Sleeves: The Type UX NMB Splice-Sleeve consists of straight steel cylinders, with two to seven internal ridges spaced between 0.50 inch (12.7 mm) and 1.00 inch (25.4 mm) on center depending on sleeve model. The midsection of the interior of the sleeve is provided with a rebar stop which establishes the proper embedment length of the reinforcing bars. As an optional feature, the sleeves are available with a set screw located on the side of the narrow end of the sleeve. The set screw is used to provide temporary attachment of the sleeve to the rebar inserted in the narrow end of the sleeve prior to the installation of the grout. The sleeve material complies with ASTM A 536 Grade 85-60-08, with minimum yield and tensile strengths of 60,000 and 85,000 pounds per square inch (414 and 588 MPa), respectively. The sleeves are furnished in sizes set forth in Table 2. The Type UX sleeves comply as a tension or compression splice for deformed reinforcing bars as specified in Section 12.14.3.2 of the IBC and Section 21.6.1 of ACI 318-08. The sleeves also comply with the Type 2 mechanical splice requirements of Section 21.6.1.2 of the IBC and Section 21.6.1.1 of ACI 318-08.

2.2.2 NMB Splice-Sleeve Type U Sleeves: The Type U NMB Splice-Sleeve consists of straight steel cylinders, with two to seven internal ridges spaced between 0.50 inch (12.7 mm) and 1.00 inch (25.4 mm) on center depending on sleeve model. The midsection of the interior of the sleeve is provided with a rebar stop which establishes the proper embedment length of the reinforcing bars. As an optional feature, the sleeves are available with a set screw located on the side of the narrow end of the sleeve. The set screw is used to provide temporary attachment of the sleeve to the rebar inserted in the narrow end of the sleeve prior to the installation of the grout. The sleeve material complies with ASTM A 536 Grade 85-60-08, with minimum yield and tensile strengths of 60,000 and 85,000 pounds per square inch (414 and 588 MPa), respectively. The sleeves are furnished in sizes set forth in Table 3. The Type U sleeves comply as a tension or compression splice for deformed reinforcing bars as specified in Section 12.14.3.2 of the IBC and Section 21.6.1 of ACI 318-08. The sleeves also comply with the Type 2 mechanical splice requirements of Section 21.6.1.2 of the IBC and Section 21.6.1.1 of ACI 318-08.

2.2.3 NMB Splice-Sleeve Type SUX Sleeves: The SUX NMB Splice-Sleeve consists of straight steel cylinders, with two to seven internal ridges spaced between 0.50 inch (12.7 mm) and 1.00 inch (25.4 mm) on center depending on sleeve model. The midsection of the interior of the sleeve is provided with a rebar stop which establishes the proper embedment length of the reinforcing bars. As an optional feature, the sleeves are available with a set screw located on the side of the narrow end of the sleeve. The set screw is used to provide temporary attachment of the sleeve to the rebar inserted in the narrow end of the sleeve prior to the installation of the grout. The sleeve material complies with ASTM A 536 Grade 85-60-08, with minimum yield and tensile strengths of 60,000 and 85,000 pounds per square inch (414 and 588 MPa), respectively. The sleeves are furnished in sizes set forth in Table 4. The Type SUX sleeves comply as a tension or compression splice for deformed reinforcing bars as specified in Section 12.14.3.2 of the IBC and Section 21.6.1 of ACI 318-08. The sleeves also comply with the Type 2 mechanical splice requirements of Section 21.6.1.2 of the IBC and Section 21.6.1.1 of ACI 318-08.

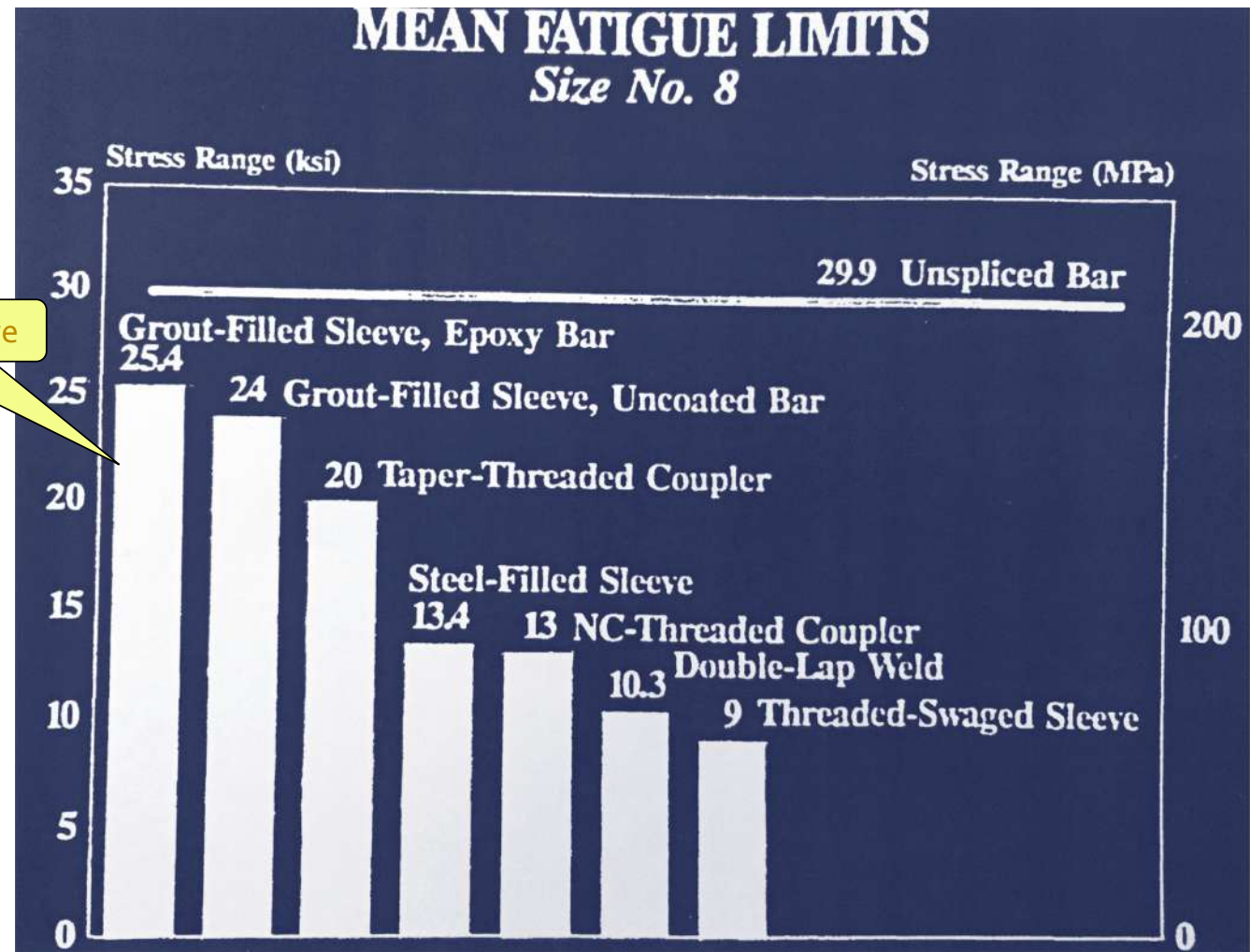
2.2.4 Reinforcing Steel Bars: The reinforcing steel bars shall be deformed bars complying with ASTM A 615 Grade 60 or ASTM A 726.

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Fatigue Behavior of Welded and Mechanical Splice in Rebar

NMB Splice Sleeve



WJE Report



SPLICE SLEEVE JAPAN, LTD. AC133 Testing of SSJ UX(SA) Grouted Splice Sleeves

Tokyo, Japan



Final Report
July 30, 2013
WJE No. 2010.3433.A



THANK YOU FOR
WATCHING!

ANY QUESTIONS?