"SPLICEMASTERS"

USHA REBAR COUPLERS

A joint that is'nt a joint

USHA AUTO ENGINEERS

An ISO 9001:2015 Company

PROVIDING ENGINEERING SOLUTIONS

SINCE 1979

A joint that is'nt a joint

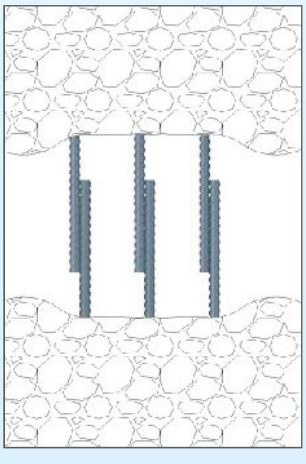
USHA REBAR COUPLERS

AN ISO 9001:2015 COMPANY

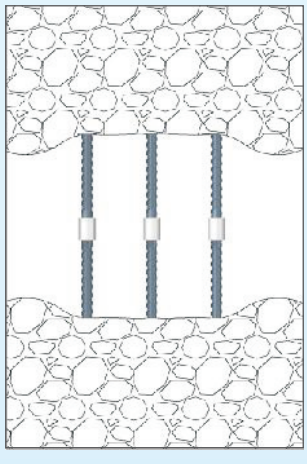
USHA caters to the need of mechanical splicing system technology for the construction industry. Our solutions offer connection of rebars with mechanical couplers over tradition lap splicing methods for bars ranging from 12mm to 50mm.

USHA Couplers over traditional methods

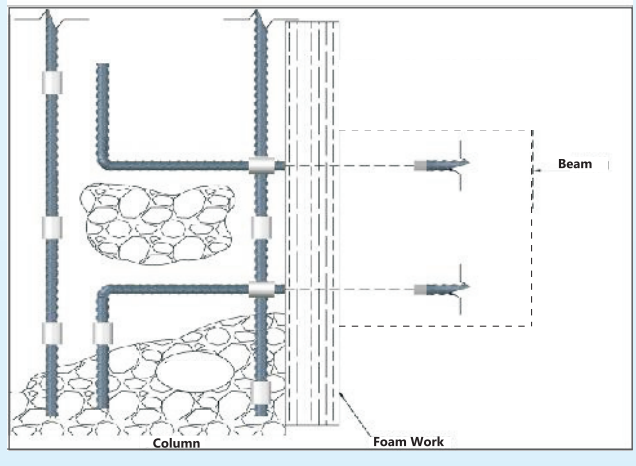
- Reducing rebar congestion in reinforced columns an improving flow of concrete.
- Eliminating cavities of honeycomb in concrete element.
- Insufficient spacing for lap splicing of rebars.
- Speed in construction of projects and reducing size of concrete section and pillars.
- High tensile and compression capacity of reinforced structure maintaining greater structural integrity where design structure demand high tensile load capabilities.
- Connecting precast members with full tension splice.
- Avoid use of expensive starter rebar box and protecting expensive formwork from being damaged by starter bars.
- Reduce steel consumption, labor cost and accelerating job schedule with easier coupling.
- More reliable than lap splicing as mechanical splices doesn't depend on concrete for load transfer.



Traditional Lap Spilcing



USHA Parallel Couplers



Quality Assurance

The quality assurance system of USHA COUPLERS ensure solutions are delivered through processes which are assessed, approved & certified to ISO 9001:2015.Our products are designed ,manufactured, inspected and tested to ensure that specification and industry standard are met and no compromise are made. Products manufactured comply to cost of the codes of practice and international; industrial standards IS 16172-2014, Bureau of Indian Standards Act, 1986.

Dedicated work force and internal audit, guaranteed quality systems are implemented across all stages, from incoming raw materials to final test and delivery. Full traceability of raw material is ensured as our products are stamped with lot no. tracing it back to the original lot of steel. Documentation of the lot are recorded and maintained with us which can be produced when requested.

Benefits :

- Construction cycle time reduced.
- Rebar wastage is reduced.
- Easy installation and requires no skilled labor.
- Threading cycle time is fast.
- Eliminating tedious lap calculation.
- One coupler for standard and positional splicing requirement.

Features :

- 100% preservation of rebar cross section area.
- Standard Metric thread.
- Ultimate tensile strength complying to IS 1786 standards.
- Superior to parent rebar tensile strength.
- Fast production cycle.

I) BASIC USE :

The rebar end preparation for Standard coupler is suitable to make Mechanical Splices with reinforcing bars in diameters 12 through 50.

Mechanical connections are a quicker, safer and more convenient alternative to lap splicing and field butt welding.

Typical applications include monolithic structures, splicing of reinforcement bars in columns and beams, diaphragm wall cages ,core walls, top-down construction ,temporary openings and obstructions ,etc.

Typical applications include development of reinforcement, column-beam knee joints, column heads, pile-feet,cantilevered members, corbels,etc.

USHA COUPLERS are manufactured from **EN8D OR C45** steel grade or equivalent.

II) APPLICABLE STANDARDS GUIDES & CODES :

USHA COUPLERS comply with all major Building codes and standards.Splicing of reinforcing bars is governed by :

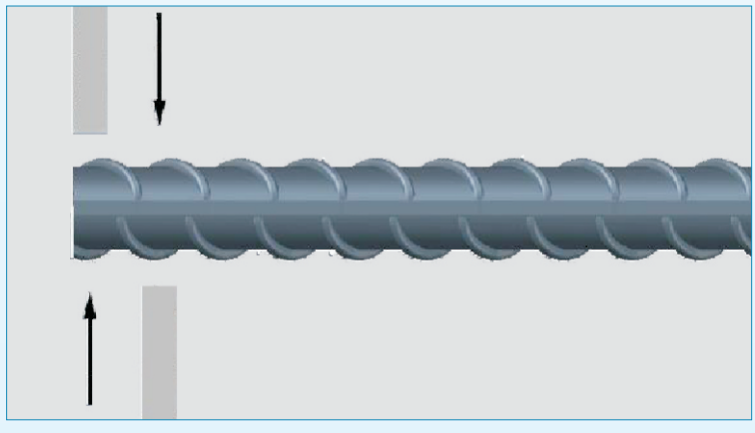
The Bureau of Indian Standards Act, in its standard IS 16172 : 2014.

III) SAFTEY FACTORS :

On a design point of view, USHA mechanical connections have been computed to far surpass all the requirements of the standards & codes cited above. The USHA splicing system achieves full strength of reinforcement bars grade 500 & 550D in the most demanding definition of "full strength" which is to prove an ultimate tensile strength higher than the actual ultimate tensile strength of the bar **(as per IS 1786).**

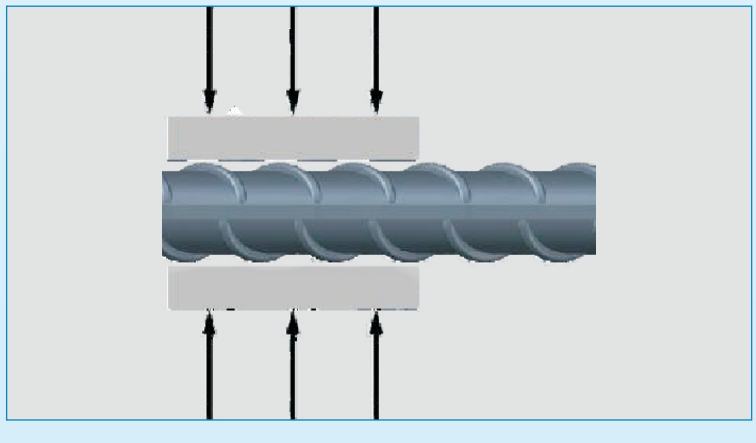
1. Cutting / Shearing of Rebars :

The Bars with improper ends like bent, too much heated, improper manufactured ends etc., are cut with Band saw machine. This is done in order to achieve a approximate Flat face for further forging of the Rebar.



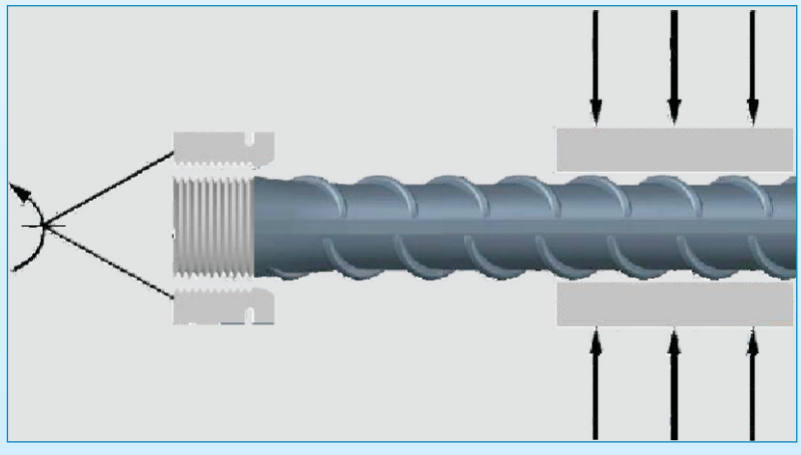
2. Pressing of Rebars :

The cut bars are then cold pressed at the ends to press the ribs of the rebar. The diameter of the bar is pressed to defined valued by applying pressure with the help of Hydraulic Ram and Gripping Dies. This process increases the life of the chasers that are required for the threading operation. This process is optional and described as cold pressing of rebar.



3. Threading of Rebars :

The pressed end of the bar are then threaded with the threading machine, the machine consists of 4 chasers, which generate the needed thread profile on the bar end. Depending on site condition, the threaded ends are stored for further site installation.



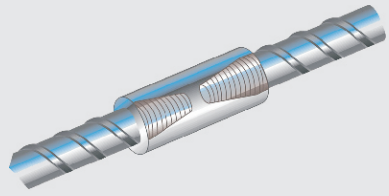
Usha Threaded Couplers

US couplers produce a full strength joint yet they are among the smallest in the USHA range, best suited to large scale projects requiring a high volume of couplers. The end of each bar to be joined is cut square and pressed by cold pressing. This increases the core strength of the bar to ensure that the joint is stronger than the bar.

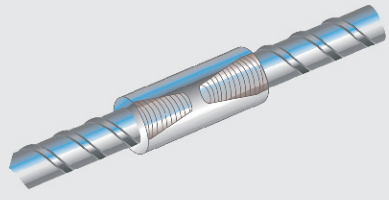
The threaded ends of the bars are protected by an optional thread protection Cap . Couplers, which are usually supplied attached to the bar, have their internal threads protected by an optional plastic end cap (CPC). For certain applications, especially where the US system is being used in deep pours, the coupler end caps may not prevent the ingress of concrete fines. For these applications, further protection may be required. US couplers are also available to join bars of different diameters.

TYPES

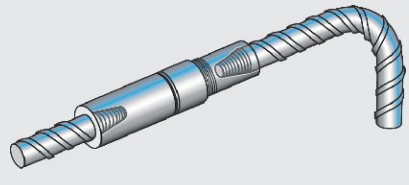
Usha Rebar Standard Couplers are type 2 couplers that are designed to splice the same dia meter bars where one bar can be rotated & the bar is not restricted in its axial direction



Usha Rebar Reducer Couplers are designed to splice different dia meter bars that can vary from 12mm to 40mm.



Usha Rebar Position Couplers are designed to splice two curves, bent or straight bars where neither bar can be rotated. These couplers are for the splicing of pile cages and prefabricated cages.



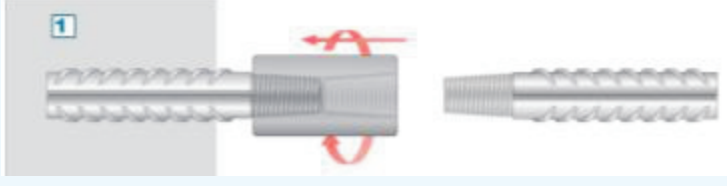
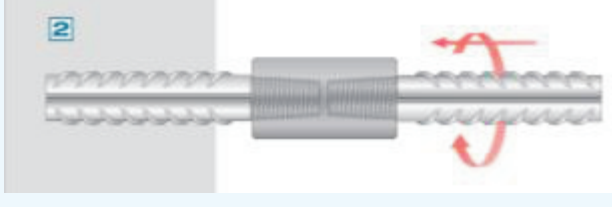
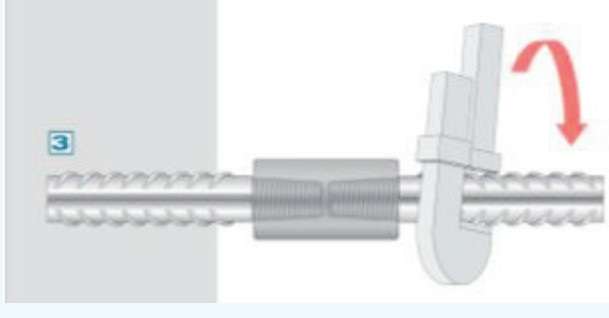
Usha rebar splicing is manufacturing high precision couplers at their high-tech manufacturing plant located in the foot hills of shivalik range.

The company follow's strict quality policies for the production of couplers.

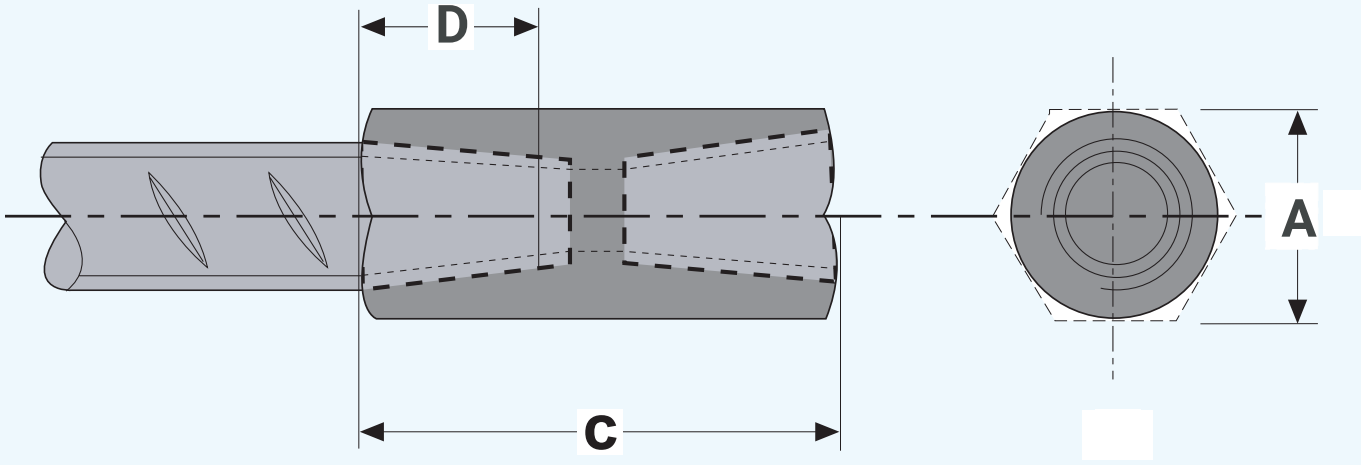
The company has dedicated and experienced team of engineers that are working in the continuous improvement of the product.

Usha rebar couplers confirms to various codes of practice like ACI 318-08. IS 16172-2014

INSTALLATION INSTRUCTIONS :

Steps	Instruction	Diagram
1	Set Torque Wrench at recommended torque value. T16 - T20 – 90Nm T25 - T40 – 180Nm	
2	With one end of the coupler connection in place, lower the incoming rebar into opposing end of the coupler.	
3	Rotate till hand locked. Using a marker draw a line along the vertical axis of the bar and coupler to indicate hand lock position.	
4	Proceed to tighten with Torque Wrench until “click” sound is heard. Note number of turns required to achieve recommended torque value. Add 15% to establish number of turns and the sum use this value to subsequent rebar connections.	

TECHNICAL SPECIFICATION



US SERIES COUPLER							
REBAR DIA		TOL.	16	20	25	28	32
MATERIAL DIA	A	+/- 1.0 mm	25	30	36	40	45
THREAD TYPE			TAPER	TAPER	TAPER	TAPER	TAPER
LENGTH	C	+/- 1.0 mm	44	61	81	86	101
THREAD ANGLE	DEGREE		60	60	60	60	60
THREAD PITCH			2.00	2.00	2.50	2.50	2.50
NO. OF INT. THREAD		- 2 Thread	10	13	15	16	18
WEIGHT	Kgs.	+/- 10 %	0.12	0.22	0.36	0.49	0.75

*Due to continuous r&D the manufactures reserves the rights to change the technical specification.

Advantages of using USHA Rebar Splicing System

Using USHA Rebar Splicing offers various advantages over the method of overlapping of reinforcement bars. Some of the prime reasons are as follows.

- Splice rebar performs like continuous reinforcement due to mechanical joint,unlike lapping which has complete dependency on concrete.
- Steel wastage is reduced significantly ,save lap length steel.
- Steel congestion is reduced due to elimination of laps .This also aides in proper flow of concrete in the critical zones and hence improves the quality of the overall structure .
- Using couplers provides superior cyclic performance as compared to lap joint it also allows greater flexibility for the designer.
- It is possible to easily verify joint strength in case of coupler as compared to lap splice where testing is cumbersome and not regulated.
- For the contractor usage of coupler reduces labour cost for installation and handling of steel. The construction schedule is improved and there is saving on valuable crane time on project.
- In last steel wastage and lap is reduced that is definitely save MONEY AND PRECIOUS TIME .

We follow the IS code of practice for testing of coupled joints as per IS 16172-2014, Bureau of Indian Standards. The code abstracted is as below.

15.2.5.3 Splicing by mechanical devices.

- Bars may be spliced with mechanical devices, e.g.by special grade steel sleeves swaged on to the bars in end to end contact or by threaded couplers. A mechanical splice including its connecting elements shall develop in tension or compression at least 125 percentage of the characteristic strength fy.
- The coupled joints should develp with FE500 TMT bar at least 125% i.e.625N/mm2 of stress value.
- The test reports are attached in the section of test reports.

Marking and traceability :

Every box of coupler is duly identified with batch no. to confirm the manufacturer & the nominal bar diameter for which it is intended for traceability purpose.

Installation Instructions :

The supplier shall provide a clear written installation instruction. The described installation process of the couplers shall be achievable in all conditions.

Specification Instructions :

As couplers are specified by reference to IS 16172-2014,some features or technical conditions should be decided case by case by the specified because they are subject to agreement between purchaser and supplier.

This information is meant to serve as a checklist for the manufacturer/supplier of couplers as well as information to the purchaser on subjects for which a specification might be relevant and included in a data sheet for the product/delivery.

SPECTRO®
ANALYTICAL LABS LIMITED
S A L
EXCELLENCE IN TESTING
E-41, Okhla Indl. Area, Ph-II,
New Delhi-110020 (INDIA)
Ph : 91-11-40522000, 41611000
Fax : 91-11-40503150, 40503151
care@spectro.in www.spectro.in
CIN - U74220DL1998PLC092698

TEST REPORT

MONTECARLO LIMITED. (BAHADURGARH)
NEW HAVEN, SECTOR 37
NUNA MAJRA JHAJJAR ROAD
BAHADURGARH, HARYANA
INDIA
Phone/Fax:
Kind Attn. :

Report No.: 170217097-2
Date: 03-Mar-2017
DOR: 17-Feb-2017
Sample Description :
SL NO-02 COUPLER DIA 20MM,MAKE USHA INV&DT-467,DT-12/01/2017 FOR PROJECT NEW HAVEN ,BAHADURGARH HARYANA

Your Ref. No. : MCL(R)/160/CA-QC/18-17/99 DT-16/02/17

ID – 170217097-2

Page No :- 01 of 01
Date of Start of Testing : 03/03/2017
Date of Completion of Test : 03/03/2017

Mechanical Testing

S.No.	Nominal Dia Of Ribbed Bar	Area of Ribbed Bar (mm^2)	Maximum Breaking Load in (KN)	U.T.S of the Ribbed Bar (N/mm^2)	Minimum Required Value of U.T.S as per IS: 16172 – 2014 (N/mm^2)	Location of fracture	Test Method	Conformity
1	20 mm	314.65	213.70	679.2	600.0	TMT Bar	IS: 16172 - 2014.	Yes
2	20 mm	314.65	225.07	715.3	600.0	TMT Bar	IS: 16172 - 2014.	Yes
3	20 mm	314.65	212.65	675.8	600.0	TMT Bar	IS: 16172 - 2014.	Yes

******End of Test Report******

Analyst: CCREQDSRA0000A11500

Authorised Signatory

MECH - 066699

NABL accredited, BIS, DSS & D, DGS, MDeH, DGCA approved,
ISO - 9001: 2008, ISO 14001 : 2004 & OHSAS 18001:2007 Certified Laboratory
CORPORATE IDENTITY NUMBER : U74220DL 1998 PLC 092698 -
Subject to Terms & Conditions Overleaf

SPECTRO ANALYTICAL LABS LIMITED
EXCELLENCE IN TESTING
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New Delhi-110020 (INDIA)
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Fax : 91-11-40503150, 40503151
care@spectro.in www.spectro.in
CIN - U74220DL1998PLC092698

TEST REPORT

MONTECARLO LIMITED. (BAHADURGARH)
NEW HAVEN, SECTOR-37
NUNA MAJRA, JHAJJAR ROAD
BAHADURGARH, HARYANA
INDIA
Phone/Fax:
Kind Attn.:

Report No.: 170217097-5 Date: 03-Mar-2017
Sample Description: DOR: 17-Feb-2017
SL NO-03 COUPLER DIA 20*16MM ,MAKE USHA INVSDT-407, DT-12/01/2017
FOR PROJECT NEW HAVEN ,BAHADURGARH, HARYANA

Your Ref. No.: MCL(R)1160/QA-QC/16-17/99 DT-16/02/17

ID – 170217097-5

Page No :- 01 of 01
Date of Start of Testing : 03/03/2017
Date of Completion of Test : 03/03/2017

Mechanical Testing

S.No.	Nominal Dia Of Ribbed Bar	Area of Ribbed Bar (mm^2)	Maximum Breaking Load in (KN)	U.T.S of the Ribbed Bar (N/mm^2)	Minimum Required Value of U.T.S as per IS: 16172 – 2014 (N/mm^2)	Location of fracture	Test Method	Conformity
1	20/16 mm	201.27	133.15	661.5	600.0	TMT bar broke 16 mm dia	IS: 16172 - 2014	Yes
2	20/16 mm	201.27	128.65	639.2	600.0	TMT bar broke 16 mm dia	IS: 16172 2014.	Yes

End of Test Report

Analyst

Authorised Signatory

MECH - 066700

NABL accredited, BIS,DGS & D, DOA, MOEF DGCA approved,
ISO - 9001: 2008 ISO 14001 : 2004 & OHSAS 18001:2007 Certified Laboratory
CORPORATE IDENTITY NUMBER : U74220DL 1998 PLC 092698
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care@spectro.in www.spectro.in
CIN - U74220DL1998PLC092698

TEST REPORT

MONTECARLO LIMITED. (BAHADURGARH)
NEW HAVEN, SECTOR-37
NUNA MAJRA, JHAJJAR ROAD
BAHADURGARH, HARYANA
INDIA
Phone/Fax:
Kind Attn. :

Report No.: 161119060-2
Sample Description :
COUPLER DIA 25M.V MAKE USHA INV.NO-356 DT-05/11/2016 FOR PROJECT N EW HAVEN BAHADURGARH,HARYANA

Your Ref. No. : MCL(R) 1160/QA-CC/18-17/003 DT 12/11/2016

Date: 22-Nov-2016
DOR: 19-Nov-2016

D- 161119060-2

Page No :- 01 of 01
Date of Start of Testing : 22/11/2016
Date of Completion of Test : 22/11/2016

Mechanical Testing

Tensile test:

S.No.	Nominal Dia of Ribbed Bar	Area of Ribbed Bar (mm^2)	Maximum Breaking Load in (kN)	U.T.S of the Ribbed Bar (N/mm^2)	Minimum Required Value of U.T.S as per IS: 16172 2014 (N/mm^2)	Location of fracture	Test Method	Conformity
1.	25 mm	490.45	344.30	702.0	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
2.	25 mm	490.45	342.50	698.3	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
3.	25 mm	490.45	340.70	694.7	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
4.	25 mm	490.45	343.20	699.8	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
5.	25 mm	490.45	341.50	696.3	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
6.	25 mm	490.45	343.20	699.8	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes

*****End of Test Report*****

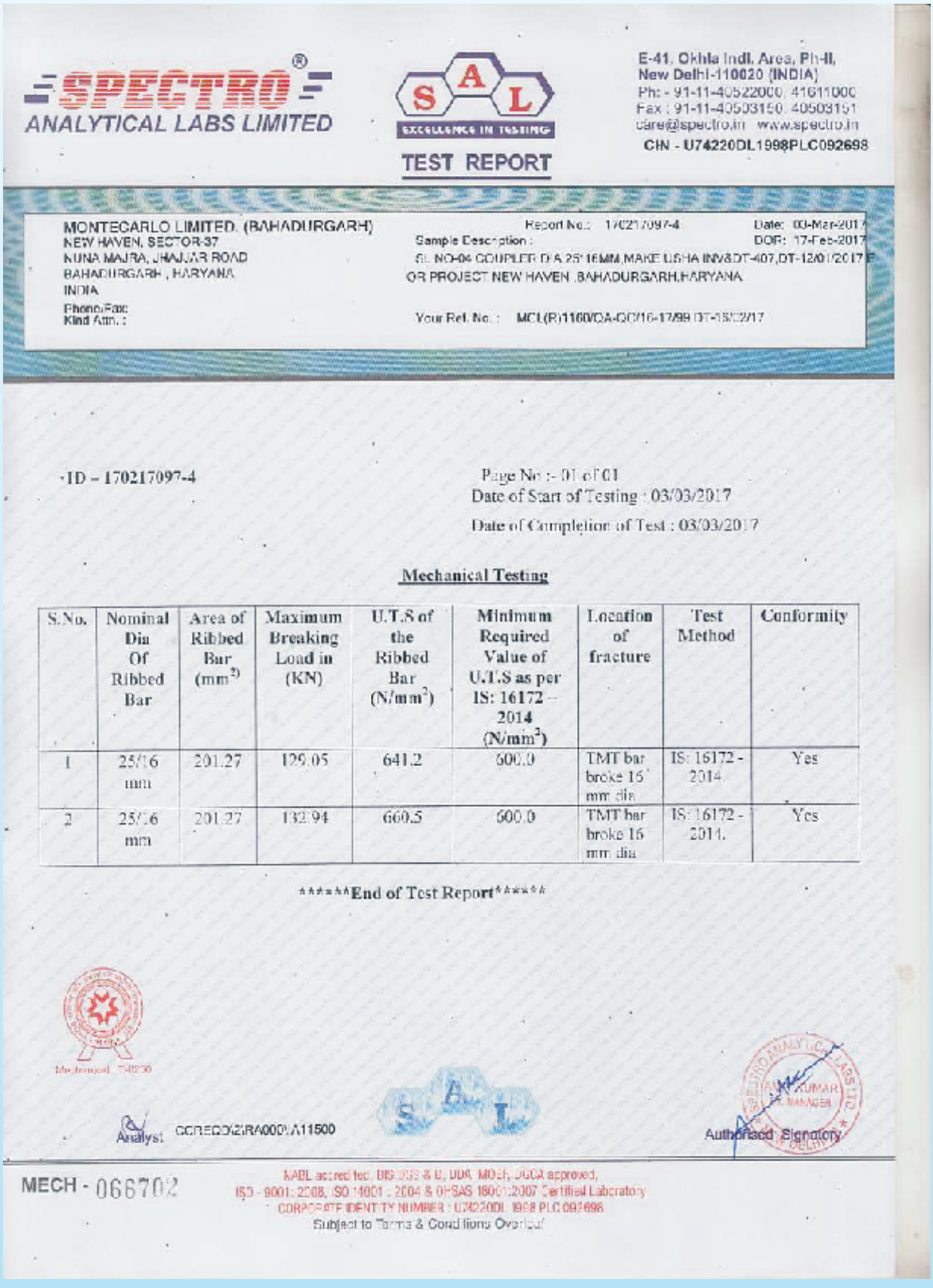
Analyst

QCREQ/BR400NA24150

SPECTRO ANALYTICAL LABS LTD. AMIT KUMAR DY. MANAGER NEW DELHI

Authorised Signatory

TRA - 201804



SPECTRO ANALYTICAL LABS LIMITED

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Fax : 91-11-40503150, 40503151
care@spectro.in www.spectro.in
CIN - U74220DL1998PLC092698

TEST REPORT

MONTECARLO LIMITED. (BAHADURGARH)
NEW HAVEN, SECTOR-37
KUNA MAJRA, JHAJJAR ROAD
BAHADURGARH , HARYANA
INDIA
Phone/Fax:
Kind Attn. :

Report No.: 170217097-4 Date: 03-Mar-2017
Sample Description : DOR: 17-Feb-2017
SL NO-04 COUPLER DIA 25/16MM,MAKE USHA INV&DT-407,DT-12/01/2017 F
OR PROJECT NEW HAVEN ,BAHADURGARH,HARYANA

Your Ref. No. : MCL(R)1160/OA-QC/16-17/99 DT-15/02/17

ID – 170217097-4

Page No :- 01 of 01
Date of Start of Testing : 03/03/2017
Date of Completion of Test : 03/03/2017

Mechanical Testing

S.No.	Nominal Dia Of Ribbed Bar	Area of Ribbed Bar (mm^2)	Maximum Breaking Load in (KN)	U.T.S of the Ribbed Bar (N/mm^2)	Minimum Required Value of U.T.S as per IS: 16172 – 2014 (N/mm^2)	Location of fracture	Test Method	Conformity
1	25/16 mm	201.27	129.05	641.2	600.0	TMT bar broke 16 mm dia	IS: 16172 - 2014.	Yes
2	25/16 mm	201.27	132.94	660.5	600.0	TMT bar broke 16 mm dia	IS: 16172 - 2014.	Yes

******End of Test Report******

Analyst QCREQ0\2\RA000\A11500

Authorised Signatory

MECH - 066702

NABL accredited, BIS, ISO & IEC 9004, MOEF, DGCA approved,
ISO - 9001: 2008, ISO 14001 : 2004 & OHSAS 18001:2007 Certified Laboratory
CORPORATE IDENTITY NUMBER : U74220DL 1998 PLC 092698
Subject to Terms & Conditions Overleaf

SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH

(A unit of Shriram Scientific and Industrial Research Foundation)

An ISO - 9001:2008 Certified Institute

TEST CERTIFICATE

000249200

Issued to :
USHA AUTO ENGINEERS,
KK-19A, HSIIDC INDUSTRIAL ESTATE,
KALKA - 133302,HARYANA

J.O.No. 208-171-0894
Reg.No. 1334664
Date 20-08-2012
GC-01 (REV-04)

Your Ref.No. -

Kind Attn: MR. SACHIN GUPTA , DIRECTOR

Date 14.08.2012

Sample Particulars :
One sample described as coupler joined with TMT bar of TATA TISCON, Grade Fe 500 D. Marked as USHA 32 MM coupler was received.

The sampling was not carried out by SHRI RAM INSTITUTE FOR INDUSTRIAL RESEARCH.
The sample particulars provided in the Test Certificate are based on the declaration by the Party.

TEST RESULTS

S.No.	Tests	Observation	Equipment Used
1.	Breaking Load, KN (Peak Load)	532	UTM-1000KN

Note: The bar broken away from the coupler joint.

Encl. - One photograph after fracture is attached.

****

D.O.R.: 14/08/2012
D.O.C.: 20/08/2012

AUTHORISED SIGNATORY
(EMPLOYEE CODE 5065)

SUNBEAM AUTO PVT. LTD.
TESTING, RESEARCH & DEVELOPMENT CENTRE
38/6, K. M. Stone, Delhi-Jaipur Highway, Narsingpur, Gurgaon - 122 001 (Haryana) India
Ph.: +91-124-4129254, Fax: +91-124-4129751/52
E-mail: lab@sunbeamauto.com URL : sunbeamlabs.com

Certificate No. 427658

TEST CERTIFICATE

Party Name : MONTE CARLO LIMITED
PROJECT NEW HAVEN
BAHADUGARH(HARYANA)

Date : 28/03/2016

Job Order No. : 603-711-1802

Reference No. : MCL(R)1160/QA-QC/16-17/006 DT.26.3.16

Date : 28.03.2016

Sample Particulars : ONE SAMPLE OF TMT BAR WITH COUPLER MARKED AS DIA 25MM DT.2.3.16 BRAND-USHA LOT NO.USHA 25 H1 WAS RECEIVED.

RESULTS

Dia (mm)	Breaking Load (KN)	Remark
25	343	Broken At TMT Bar, Away From The Coupler

*****End of Result*****

Sunbeam Auto Pvt. Ltd. Testing R & D Center
Sr. Manager
Authorised Signatory

1. Sample will be retained only for one month.
2. The results listed refer only to the tested samples and applicable parameter. Endorsement of product is neither inferred nor implied.
3. Total liability of our works is limited to invoiced amount.
4. This report can not be used as an evidence in a court of law without prior permission of laboratory.

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care@spectro.in www.spectro.in
CIN - U74220DL1998PLC092698

TEST REPORT

MONTECARLO LIMITED. (BAHADURGARH)
NEW HAVEN, SECTOR-37
NUNA MAJRA, JHAJJAR ROAD
BAHADURGARH, HARYANA
INDIA
Phone/Fax:
Kind Attn.:

Report No : 170217097-3 Date: 03-Mar-2017
Sample Description : DCR: 17-Feb-2017
SL NO-03 COUPLER DIA 25*20MM ,MAKE USHA INV&DT-407 DT-12/01/2017
FOR PROJECT NEW HAVEN ,BAHADURGARH,HARYANA

Your Ref. No. : MCL(R)1160/QA-CC/16-17/99 DT-15/02/17

ID 170217097-3

Page No :- 01 of 01
Date of Start of Testing : 03/03/2017
Date of Completion of Test : 03/03/2017

Mechanical Testing

S.No.	Nominal Dia Of Ribbed Bar	Area of Ribbed Bar (mm^2)	Maximum Breaking Load in (KN)	U.T.S of the Ribbed Bar (N/mm^2)	Minimum Required Value of U.T.S as per IS: 16172 – 2014 (N/mm^2)	Location of fracture	Test Method	Conformity
1	25/20 mm	314.65	211.29	671.5	600.0	TMT bar broke 20 mm dia	IS: 16172 - 2014.	Yes

******End of Test Report******

Analyst

Authorised Signatory

MECH - 066701

NABL accredited, BIS, DSS & U, DGS, MOT, DGCA approved,
ISO - 9001: 2008, ISO 14001 : 2004 & OHSAS 18001:2007 Certified Laboratory
CORPORATE IDENTITY NUMBER : U74220DL 1998 PLC 092698
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Fax : 91-11-40503150, 40503151
corre@spectro.in www.spectro.in

CIN - U74220DL1998PLC092698

TEST REPORT

MONTECARLO LIMITED. (BAHADURGARH)
NEW HAVEN, SECTOR-37
KUNA MAJRA, JHAJJAR ROAD
BAHADURGARH , HARYANA
INDIA
Phone/Fax:
Kind Attn.:

Report No.: 161116060-1 Date: 22-Nov-2016
Sample Description: DCR: 19-Nov-2016
COUPLER DIA EMM MAKE USHA INV.NO-356 DT-09/11/2015 FOR PROJECT N EW HAVEN BAHADURGARH,HARYANA

Your Ref. No.: MCL/(R) 1130/QA-QC/16-17/009 D -12/11/2016

D-16111960-1

Page No : 01 of 01
Date of Start of Testing : 22/11/2016
Date of Completion of Test : 22/11/2016

Mechanical Testing

Tensile test:

S.No.	Nominal Dia of Ribbed Bar	Area of Ribbed Bar (mm^2)	Maximum Breaking Load in (KN)	U.T.S of the Ribbed Bar (N/mm^2)	Minimum Required Value of U.T.S as per IS: 16172 – 2014 (N/mm^2)	Location of fracture	Test Method	Conformity
1.	16 mm	201.27	141.45	702.8	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
2.	16 mm	201.27	140.40	697.6	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
3.	16 mm	201.27	140.10	696.1	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
4.	16 mm	201.27	140.26	696.9	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
5.	16 mm	201.27	139.72	694.2	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
6.	16 mm	201.27	132.80	659.8	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
7.	16 mm	201.27	141.10	701.0	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
8.	16 mm	201.27	136.52	678.3	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
9.	16 mm	201.27	135.72	674.3	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
10.	16 mm	201.27	138.5	688.2	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
11.	16 mm	201.27	138.24	686.8	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
12.	16 mm	201.27	141.25	701.8	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
13.	16 mm	201.27	137.64	683.9	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
14.	16 mm	201.27	137.92	685.4	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes
15.	16 mm	201.27	141.00	700.6	600	TMT bar	IS: 16172-14 (Clause 9.2.1)	Yes

*****End of Test Report*****

Analyst

QCREQ03\RA003\IA24150

SPECTRO ANALYTICAL LABS LTD. AMIT KUMAR CH. MANAGER NEW DELHI-20

Authorised Signatory

TRA - 291727

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VIRENDRA K. BAFNA
B. E. M. Eng. (Canada)
M.S.I.M. (U.S.A.) M. A. S. T. M

TCR / QF / 5101

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Email : sales@tcreng.com

Certificate No. NABL-T-367,
NABL-T-368 & NABL-T-3304
NABL ISO 17025
ACCREDITED LABORATORY

TEST CERTIFICATE

T.C. No. : BS9552 **Date:** 15-01-2019

Issued To. : **USHA AUTO ENGINEERS**
KK-19A, HSIDC INDL. ESTATE,
KALKA, PANCHKULA, HARYANA - 133302

Party Ref.	: Letter Dated : 11-01-2019	**Condition of Sample**	: Test piece
Ref. Date	: 11-01-2019		
Nature of Sample	: Rebar Coupler With TMT Bars, Make : USHA Batch No.USHA20A1, Material Grade : EN8D		
Specification	: IS 16172:2014 / Grade 500D	**Sample Received on**	: 12-01-2019
Sample Drawn By	Party	**Date of Completion**	: 15-01-2019
		Enclosure	: NIL

Test : Slip.

Size 20mm Dia

Slip Test. **Test Method : IS 16172 : 2014**
Equipment : ZD 100/0-1000KN

		Requirement
Rebar diameter (mm)	20.00	
Nominal Cross-sectional Area (mm)	314.3	
Extensometer Gauge Length (mm)	200.00	
Length of the mechanical splice measured before loading (L2) (mm)	120.10	
Applied load (0.6 × Fy) in Newton (N)	94290	
Length of the mechanical splice measured after loading (L1) (mm)	120.19	
ΔLs (L1-L2)	0.09	
Load released on 20 N/mm2	6286	
Extensometer Reading	0.07	
Total slip (mm)	0.08	0.1Max
Ultimate Tensile Load in Newton (N)	201500	
Ultimate Tensile Strength (N/mm2)	641.11	
Location Of Failure	Outside of Mechanical Splice Length	
Remark	Pass	

Remark: The material conforms to IS 16172:2014 / Grade 500D with respect to test/s carried out

******END OF REPORT******

vk/-

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Checked By

Authorised Signatory

AVINASH I TAMBEWAGH
(Head-Advanced Testing)

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2) Test Certificate shall not be re - produced except in full without the written approval of laboratory.
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Navi Mumbai - 400 710.
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Email : sales@tcreng.com

TEST CERTIFICATE

T.C. NO. BK7394 DATE : 20-07-2017

Issued To. **USHA AUTO ENGINEERS**
KK-19A, HSIDC INDL. ESTATE,
KALKA, PANCHKULA, HARYANA - 133302

Party Ref.:	: LETTER	Date	: 20-05-2017
Nature of Sample	: Coupler Joint With TMT Steel Bars	Condition of Sample	: Finish Item
Specification	: IS 16172-2014 /Gr. EN-8D	Sample Received On	: 21-06-2017
Sample Drawn By	: Party	Date of Completion	: 20-07-2017
Enclosure	: Graph & Photos		

Low Cycle Fatigue Test

Batch No : USHA32D1
Test method : IS 16172-2014 / IS 1608-2005

MECHANICAL PARAMETERS	VALUE
Rebar Diameter (mm)	32.00
Nominal cross-sectional area (mm^2)	804.60
Stress Range (MPa)	346.00
Stress in Tension (MPa)	173.00
Stress in Compression (MPa)	173.00
Load in Tension (kN)	139.10
Load in Compression (kN)	139.10
Constant Frequency (Hz)	0.35
Total no. Of Cycles	10000
Observation: Fracture did not occur after 10000 cycles.	
U.T.L. (N)	574400
U.T.S. (N/mm^2)	713.89
Fracture : OUTSIDE OF MECHANICAL SPLICE LENGTH	

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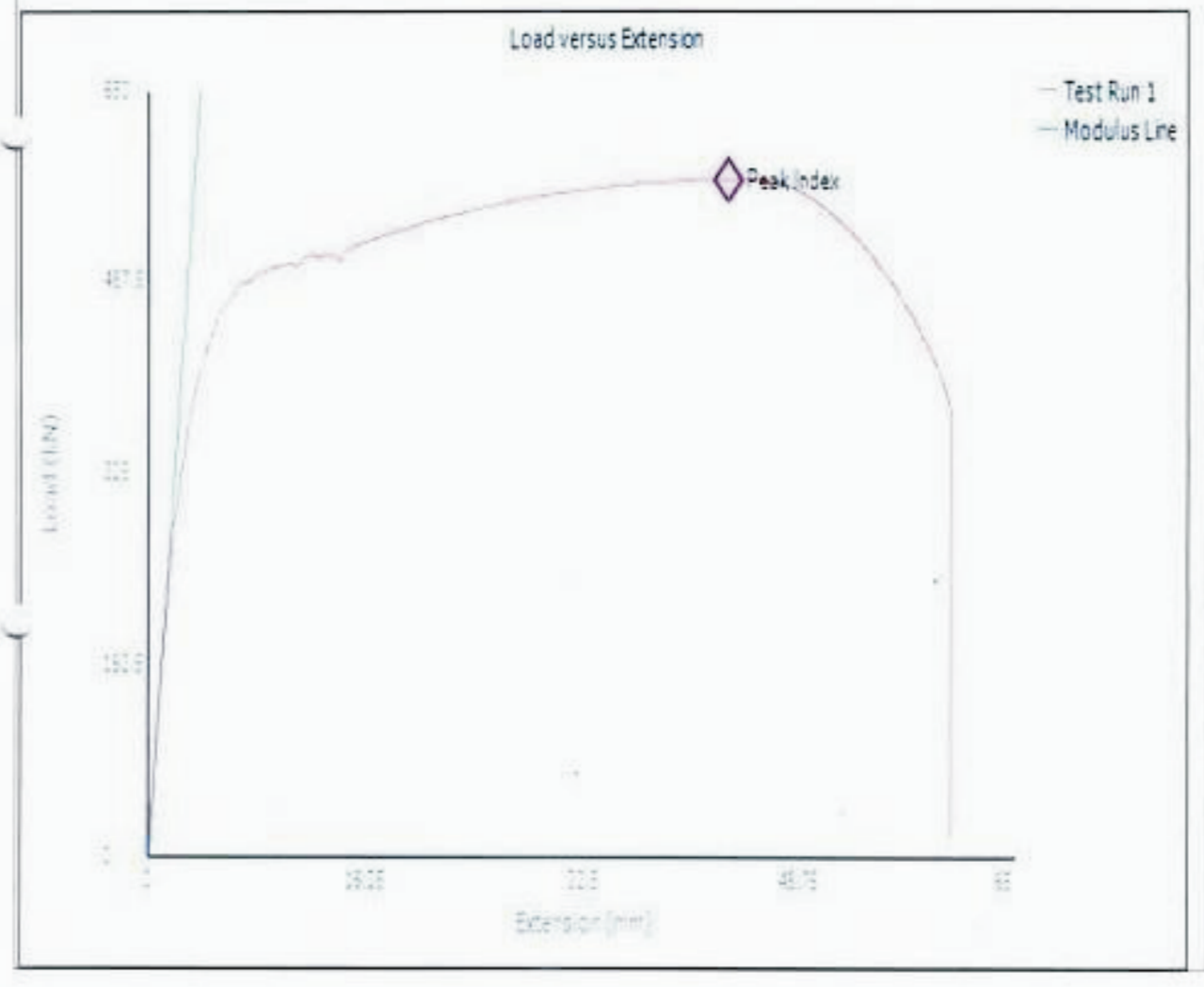
TEST CERTIFICATE

T.C.NO : BK-7579 **ANNEXURE 2** **DATE :** 20-07-2017

LOAD v/s EXTENSION GRAPH



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Navi Mumbai - 400 710.
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TEST CERTIFICATE

T.C. No. BK7393 **Date:** 22-05-2017

Issued To. USHA AUTO ENGINEERS
KK-19A, HSIDC INDL. ESTATE,
KALKA, PANCHKULA, HARYANA - 133302

Party Ref.	:	Letter Dt. 20-05-2017	**Condition of Sample**	: Finish Item
Nature of Sample	:	Coupler Joint With TMT Steel Bars		
Specification	:	Gr.EN-8D	**Sample Received on**	: 20-05-2017
Sample Drawn By: Party			**Date of Completion**	: 22-05-2017
			Enclosure	: Graph

Test : Cyclic Tensile Test (100 Cycle)

Batch No : USHA25C2

Size : 25 mm Dia

	Result	Requirement
Cyclic Tensile Test (100 Cycle)	**Test Method : IS 16172 : 2014**	
Eqpt/Range: 250KN UTM		
Rebar Dia (mm)	25.00	
Nominal Cross Sectional Area (mm²)	491.10	
Upper Stress (N/mm²) (90% of Yield Stress)	450	
Lower Stress(N/mm²) (5% of Yield Stress)	25	
Max. Load (N)	220.99	
Min. Load (N)	12.27	
Constant Frequency (Hz)	0.7	
Total No. of Cycles	100	
Observation	After 100 cycles specimen not fail.	
U.T.S (N/mm²)	748.93	

******END OF REPORT******

vk/-

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Authorised Signatory

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TEST CERTIFICATE

T.C. No. RK7394 **Date:** 22-05-2017

Issued To. USHA AUTO ENGINEERS
KK-19A, HSIDC INDL. ESTATE,
KALKA, PANCHKULA, HARYANA - 133302

Party Ref.	:	Letter Dt. 20-05-2017	**Condition of Sample**	:	Finish Item
Nature of Sample	:	Coupler Joint With TMT Steel Bars			
Specification	:	Gr En 8D	**Sample Received on**	:	20-05-2017
Sample Drawn By: Party			**Date of Completion**	:	22-05-2017
			Enclosure	:	NIL

Test : Slip Test

Batch No : USHA25C2

Size : 25 mm Dia

	Result	Requirement
SLIP TEST...	**Test Method : IS 16172 : 2014**	
Equ/Range : ZD 100/0-1000KN		
Rebar diameter (mm)	25.00	
Nominal Cross-sectional Area (mm)	491.1	
Extensometer Gauge Length (mm)	200.00	
Length of the mechanical splice measured before loading (L2) (mm)	160.10	
Applied load (0.6 × Fy) in Newton (N)	147330	
Length of the mechanical splice measured after loading (L1) (mm)	160.18	
ΔLS (L1-L2)	0.08	
Load released on 20 N/mm2	9822	
Extensometer Reading	0.09	As per IS 16172-2014 0.1 Max
Total slip (mm)	0.085	
Ultimate Tensile Load in Newton (N)	359710	
Ultimate Tensile Strength (N/mm2)	732.46	
Fracture	Out side of mechanical splice length.	
Remark	Pass	

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A joint that is'nt a joint

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