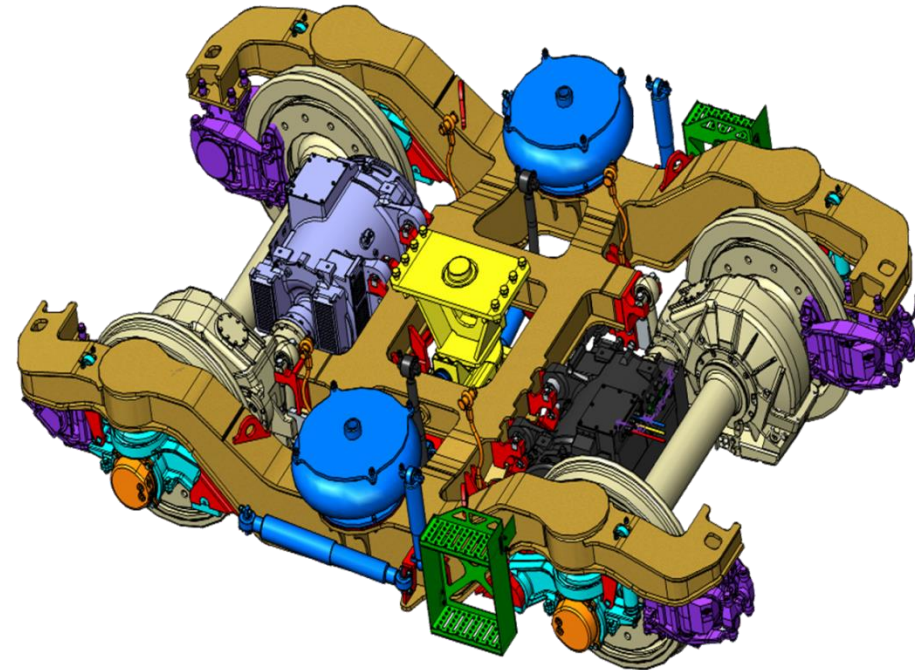




BOGIE FOR TRAIN18



DESIGN FEATURES

EVOLUTION OF BOGIES IN INDIAN RAILWAYS

➤ IRS BOGIE

➤ MAN-HAL BOGIE BEM

➤ SCHILEREN BOGIE

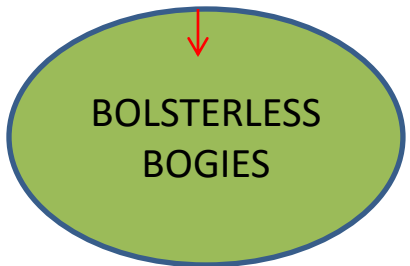
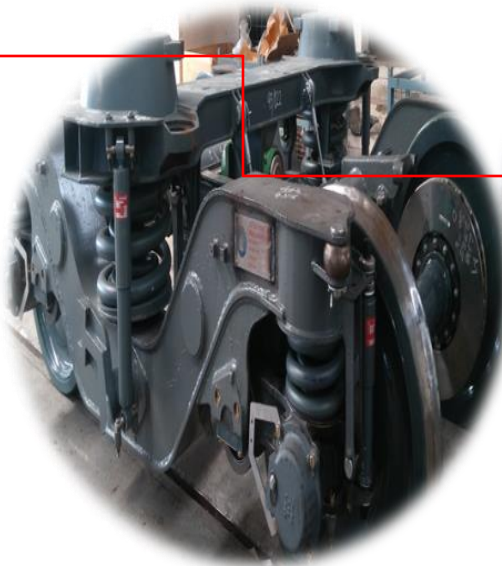
➤ ICF ALL COIL BOGIE

➤ EMU/DEMU BOGIE

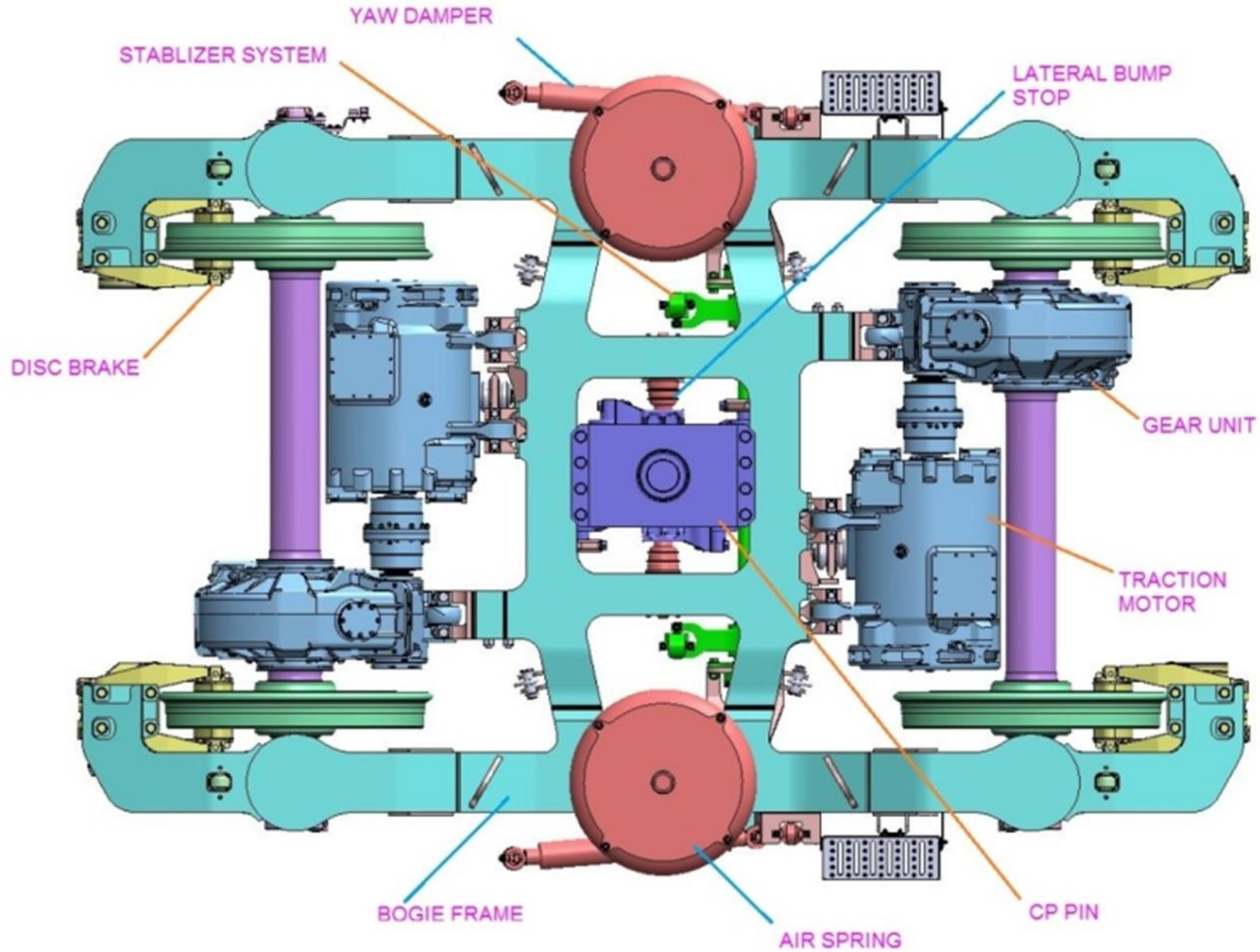
➤ FIAT BOGIE

➤ TRAIN-18 BOGIE

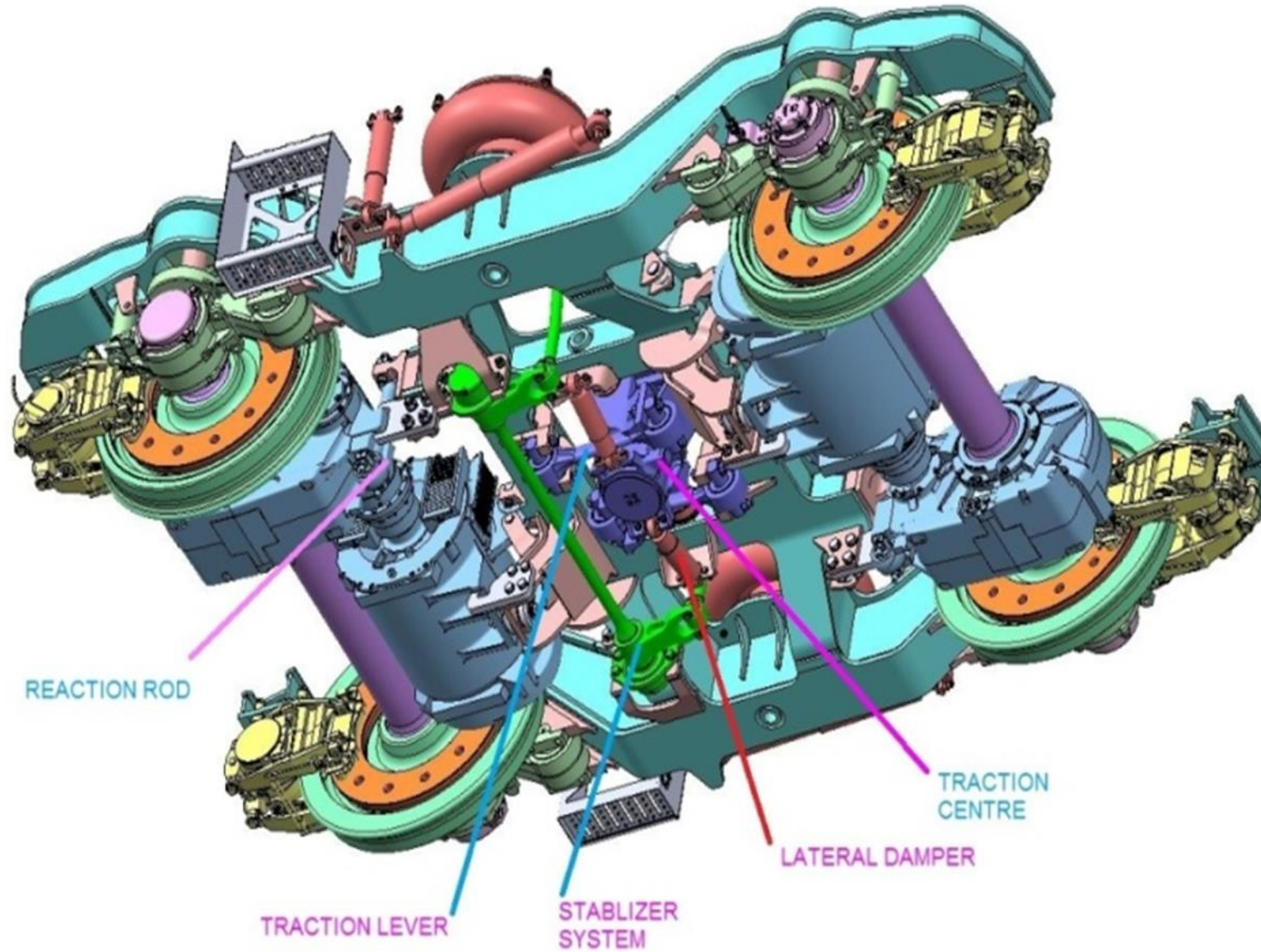
BOLSTERLESS
BOGIES



VARIOUS PARTS OF THE TRAIN 18 BOGIE



VARIOUS PARTS OF THE TRAIN 18 BOGIE

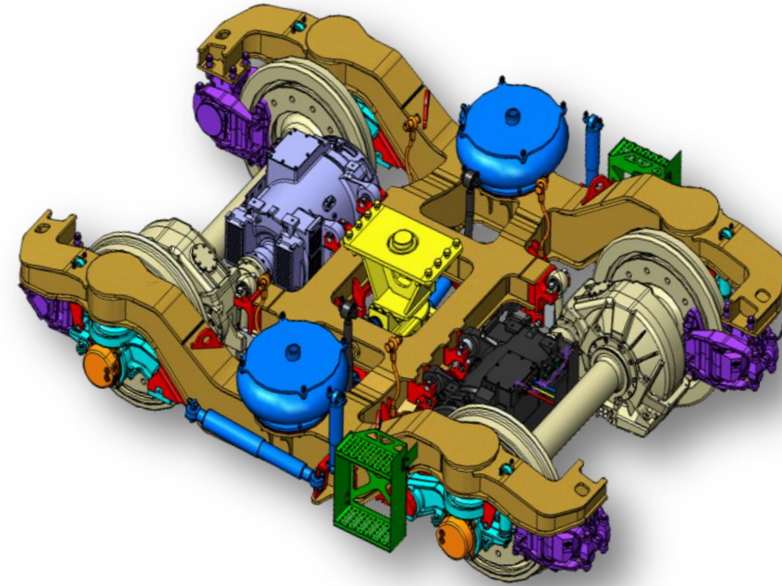


DESIGN FEATURES OF BOGIE FOR TRAIN 18

➤ FIT FOR 160 KMPH OPERATION

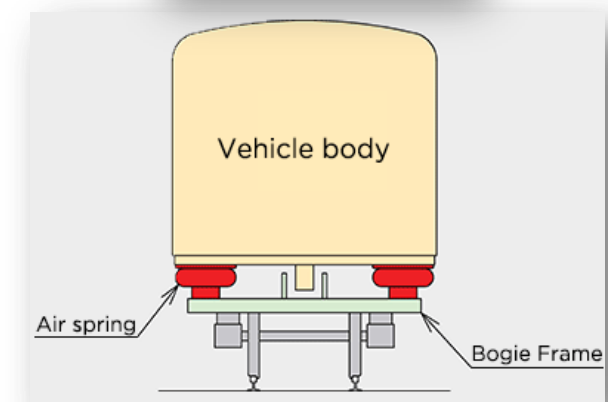
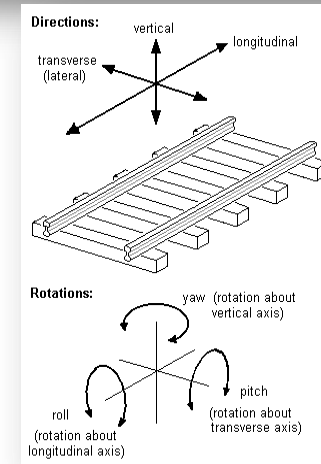
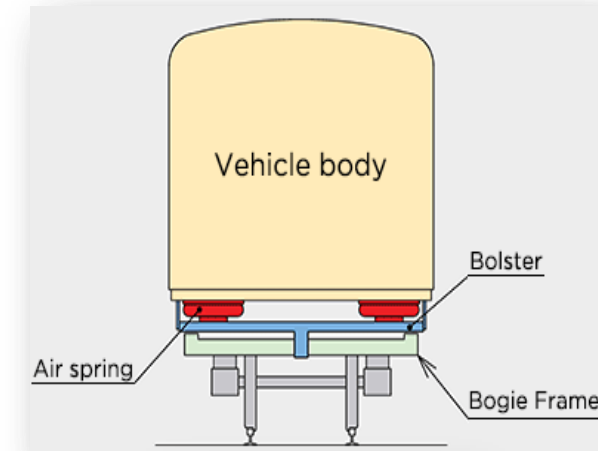
FACTORS:

- ☐ BOLSTERLESS DESIGN
- ☐ EFFECTIVE BRAKING SYSTEM
- ☐ SUITABLE SUSPENSION GEAR
- ☐ IMPROVED DRIVING GEAR SYSTEM
- ☐ OVERALL WEIGHT REDUCTION
- ☐ REDUCED UNSPRUNG MASS
- ☐ ANTIROLL BAR ARRANGEMENT

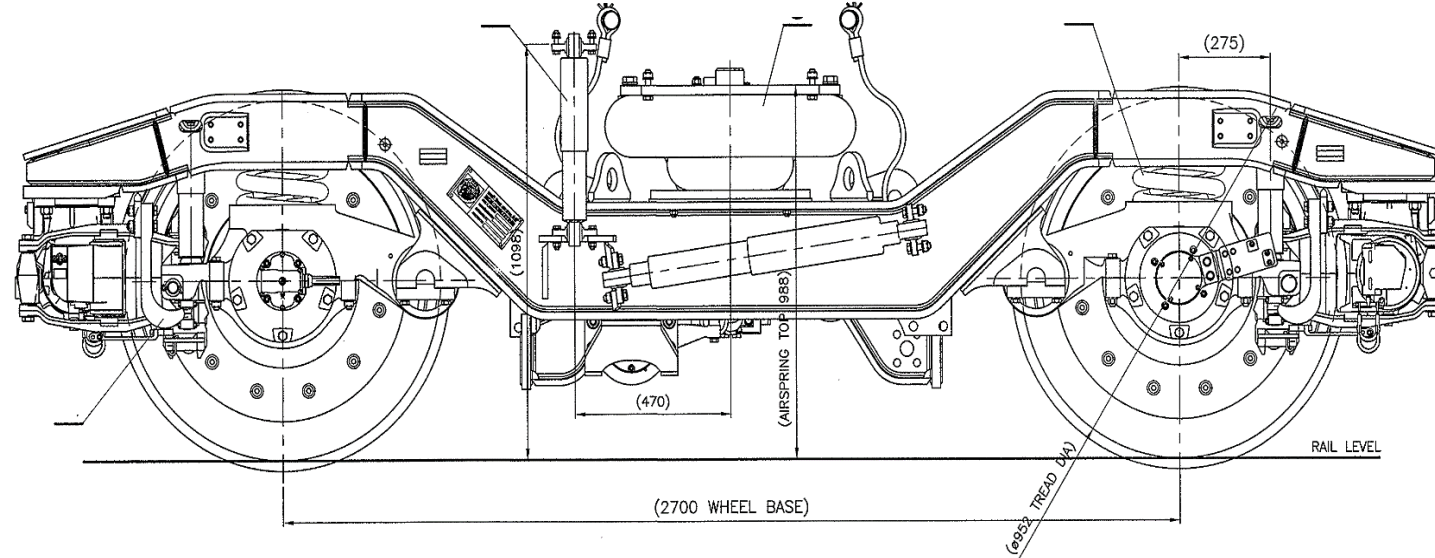


BOLSTERLESS DESIGN

- This degree of freedom is provided by the springs themselves working in flexi coil mode in bolster less bogies



BOGIE TRAIN 18 WHEEL BASE

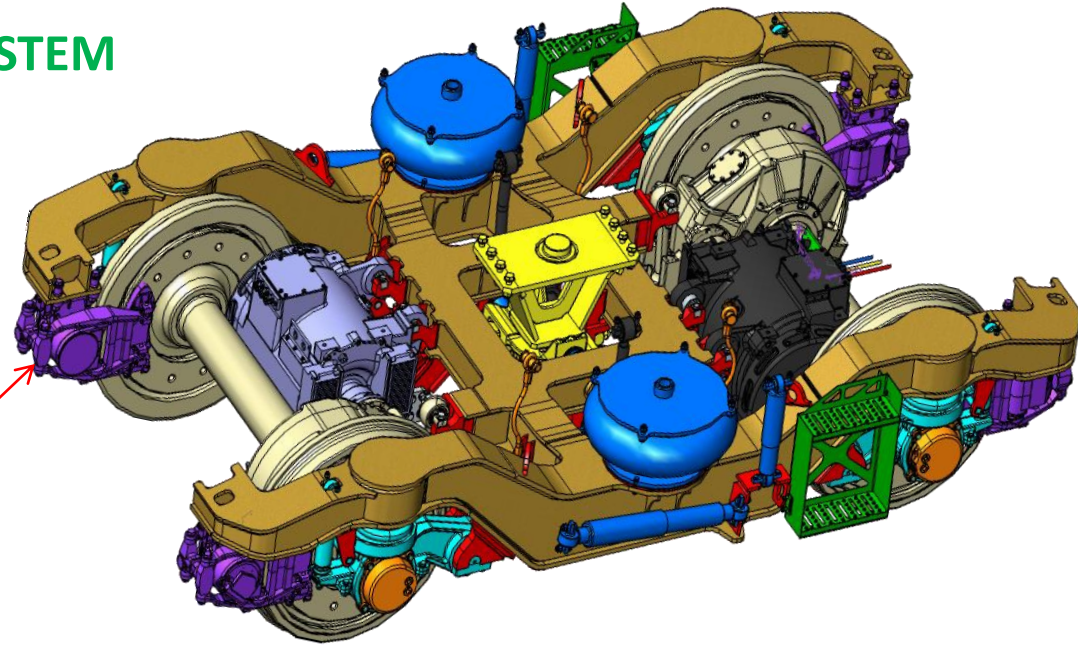


- WHEEL BASE- 2700 mm
- WHEEL DIA - 952 mm

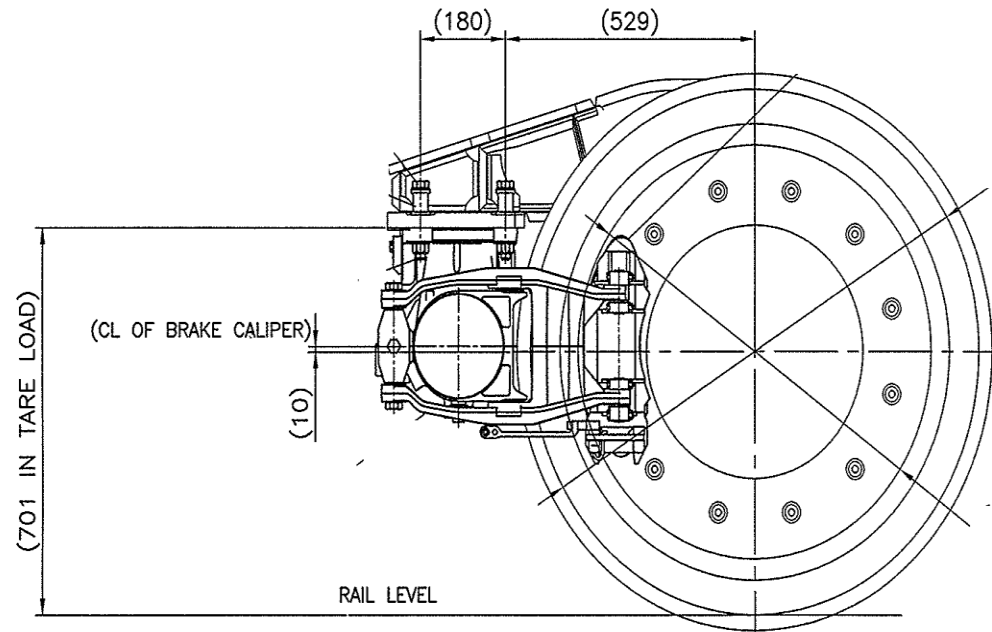
WHEEL BASE COMPARISON

IRS	3038 mm
ICF	2896 mm
FIAT	2560 mm
METRO	2450 mm
TRAIN 18	2700 mm

WHEEL MOUNTED DISC BRAKE SYSTEM

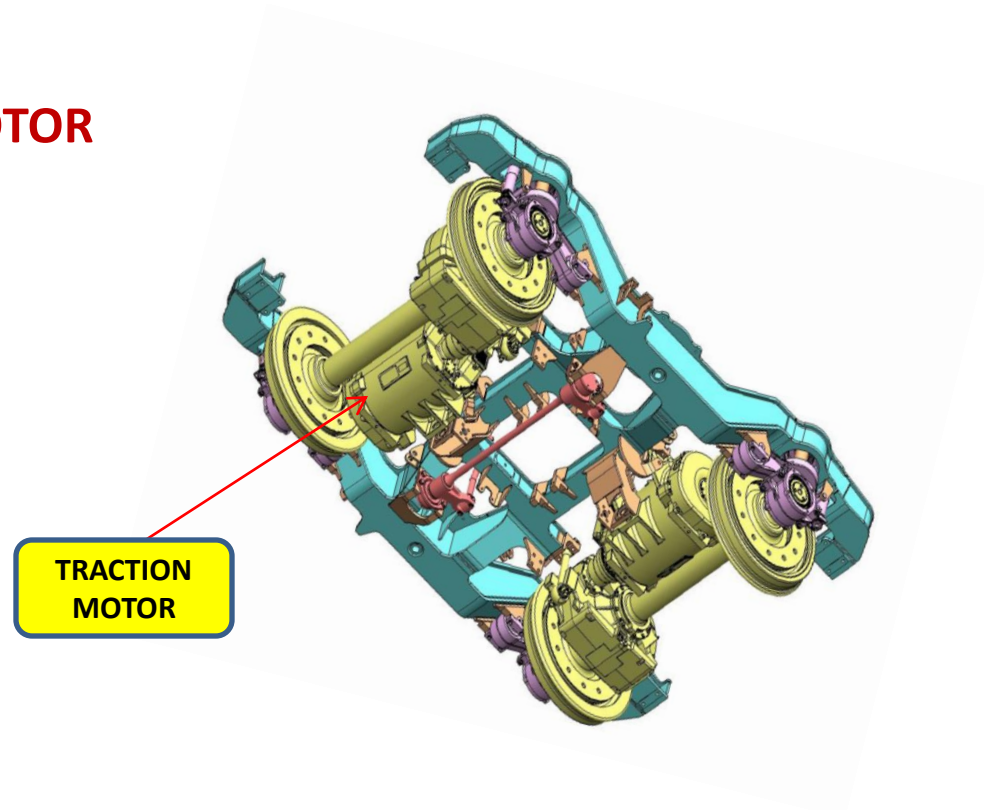


- BRKE DISC OUTER DIA-750 mm
- BRAKE DISC INNER DIA -460 mm

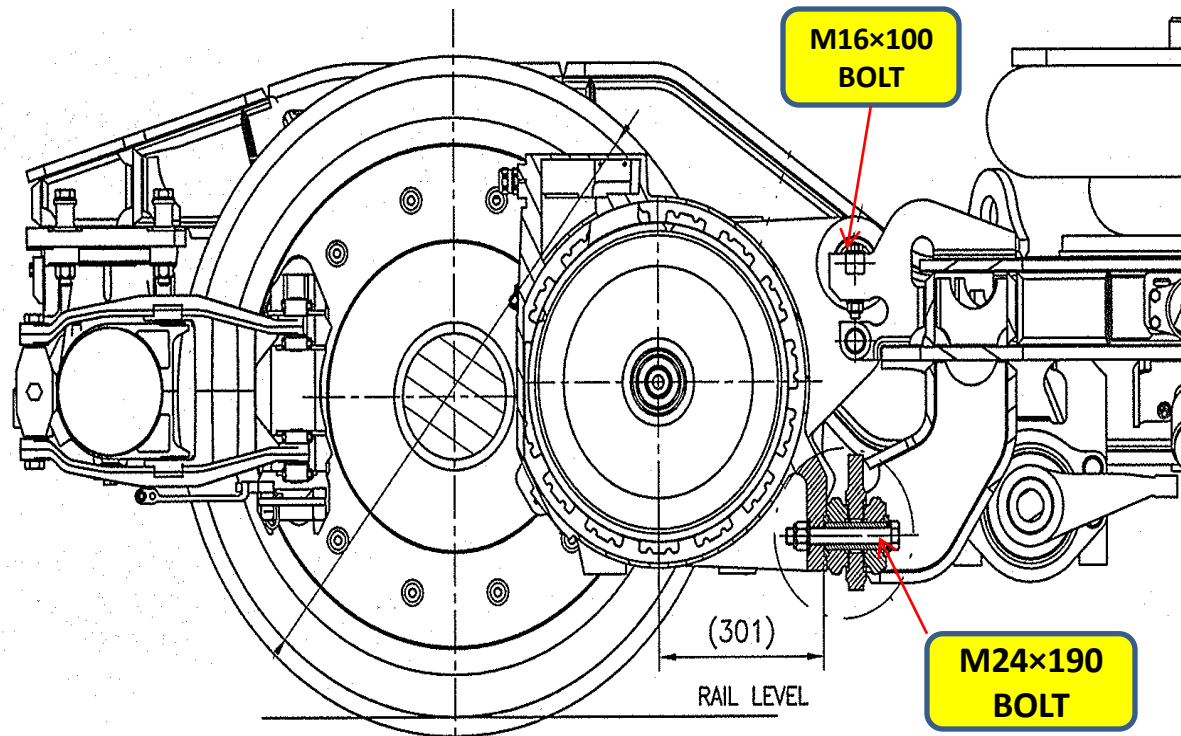


FULLY SUSPENDED TRACTION MOTOR

- # REDUCED UNSPRUNG MASS
- # IMPROVE RAIL WHEEL ADHESION
- # IMPROVED RIDING COMFORT



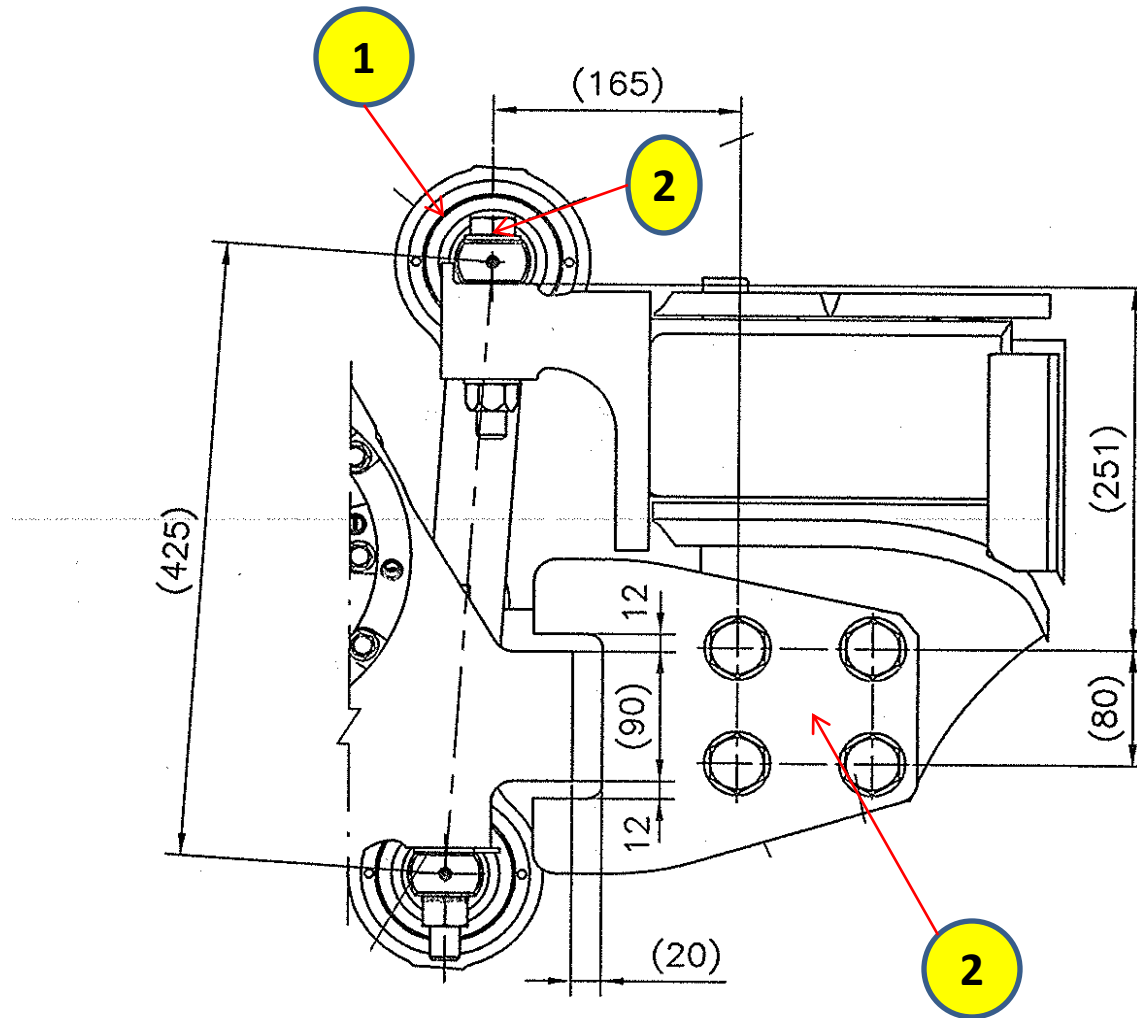
BOGIE TRAIN 18 TRACTION MOTOR ASSEMBLY



- TRACTION MOTOR COMPLETE WITH COUPLING SUPPLIED BY M/s MEDHA.
- ANTI SEIZE COMPOUND ANABOND SHOULD BE APLIED IN THREADS
- TIGHTENING TORQUE OF BOLTS

M16	508 NM
M24	867 NM

REACTION ROD ASSEMBLY



1. REACTION ROD

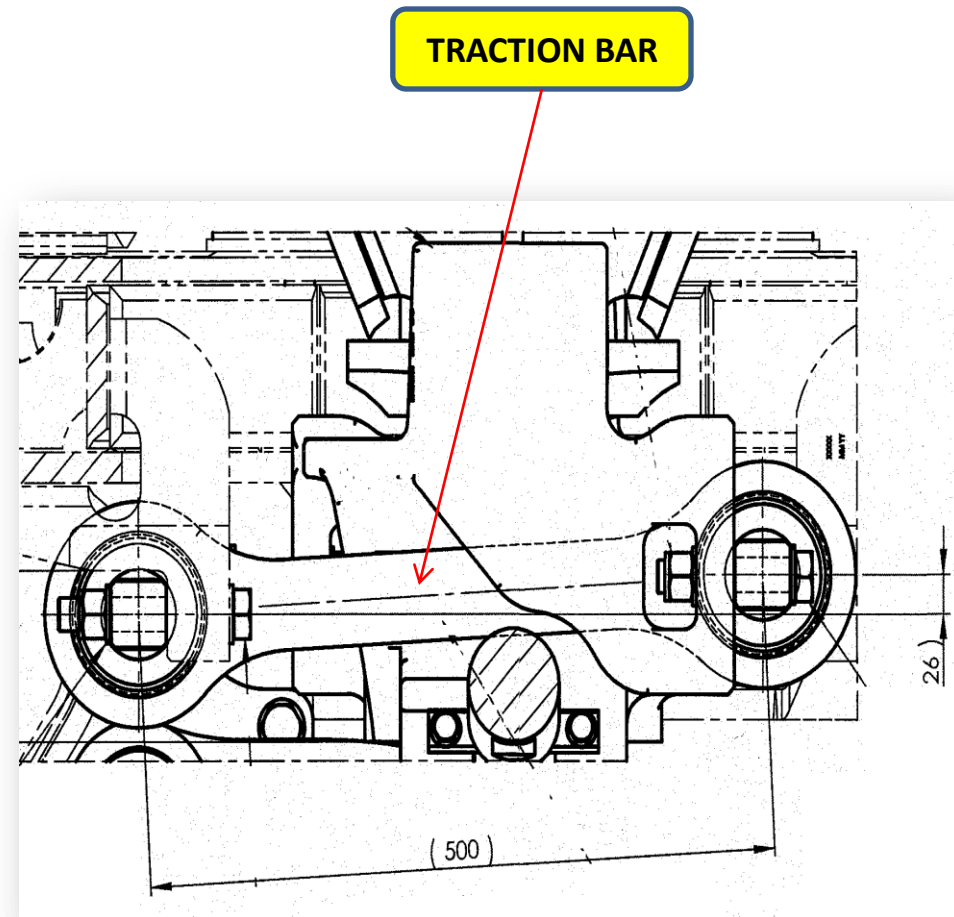
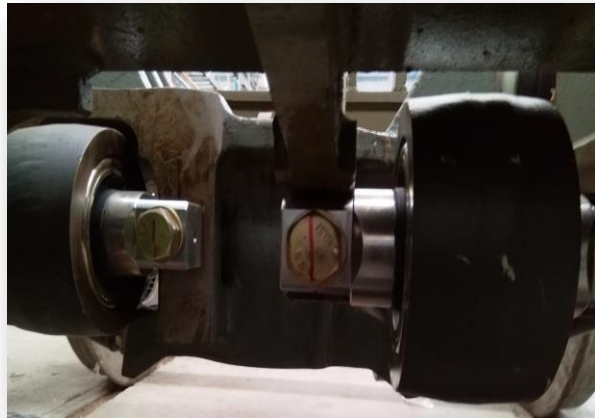
2. M20x140 BOLT TIGHTENING
TORQUE 510 NM

3. SAFETY CATCH FOR GEAR CASE

SUPPLIER M/s TSA or M/s MEDHA

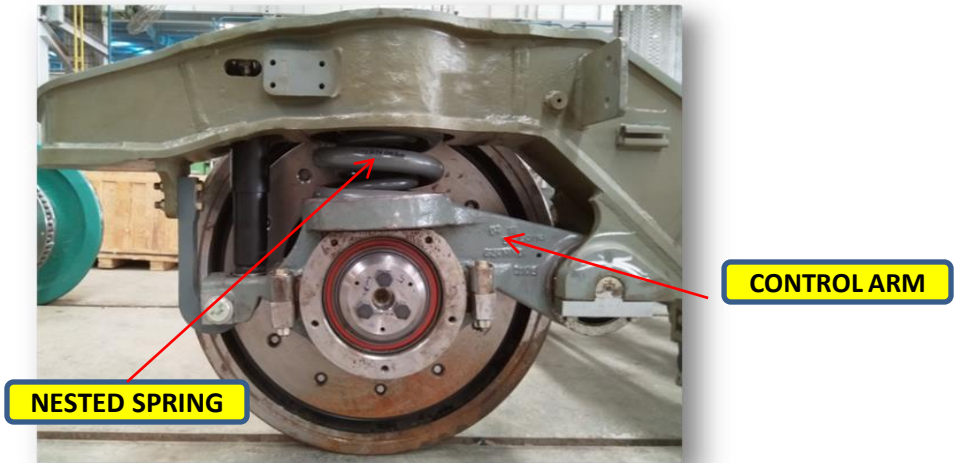
TRACTION BAR ASSEMBLY

- TRANSMIT TRACTIVE AND BRAKING FORCE
- TRACTION BAR COMPLETE SUPPLIED BY M/s GMT
- TRACTION BAR ASSEMBLED WITH M22×110 BOLT TIGHTENED WITH TORQUE 692 NM

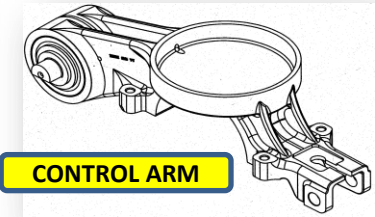
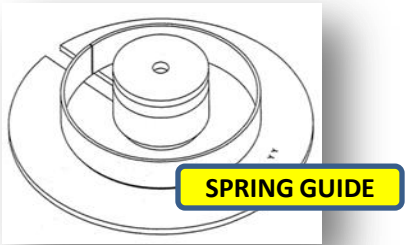
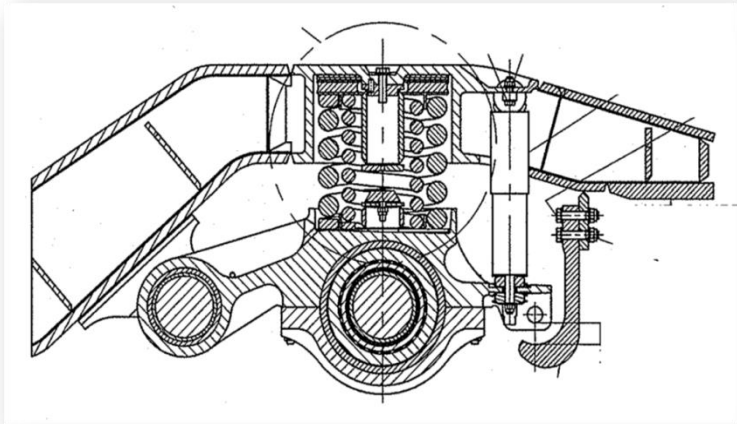


PRIMARY SUSPENSION ASSEMBLY

- NESTED SPRING
- VERTICAL SHOCK ABSORBER

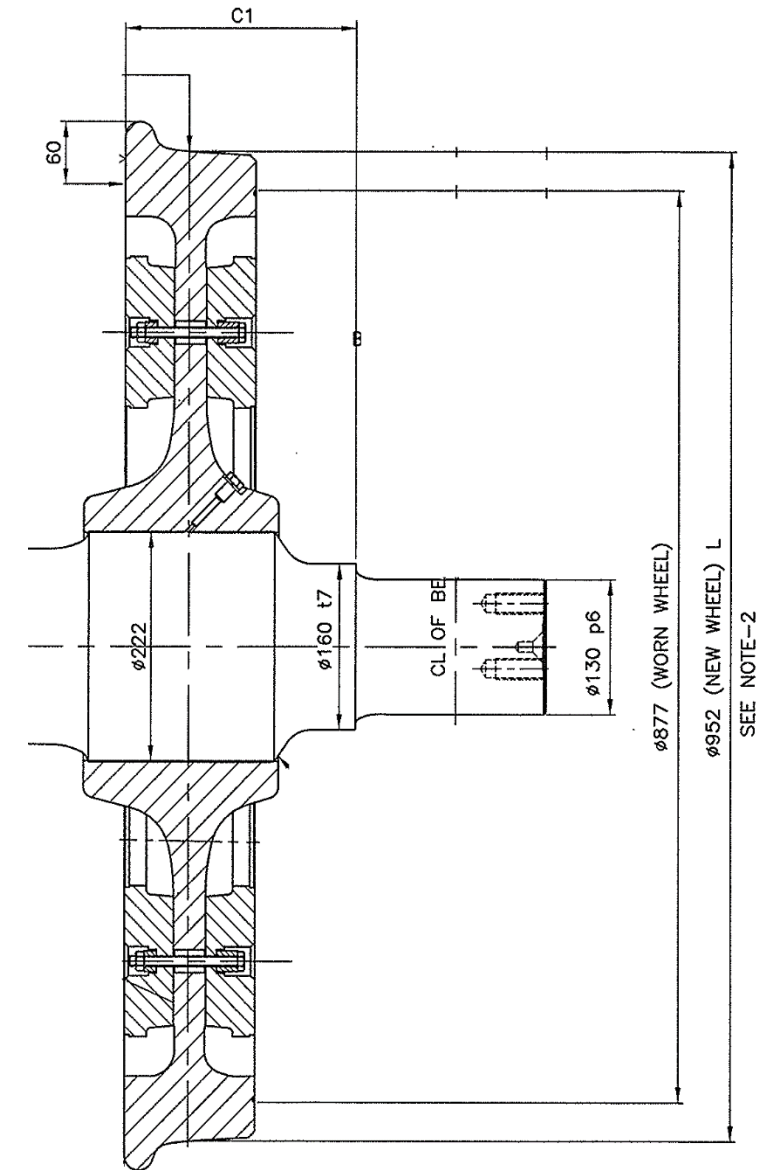


PRIMARY SUSP. ARRGT. TORQUE RANGE FOR FOLLOWING BOLTS AND NUTS		
SL.NO.	SIZES	TIGHTING TORQUE VALVE
1	M12 - 10.9	80 NM
2	M16 - 10.9	192 NM
3	M16 - 10.9	242 NM
4	M16 - 10.9	321 NM

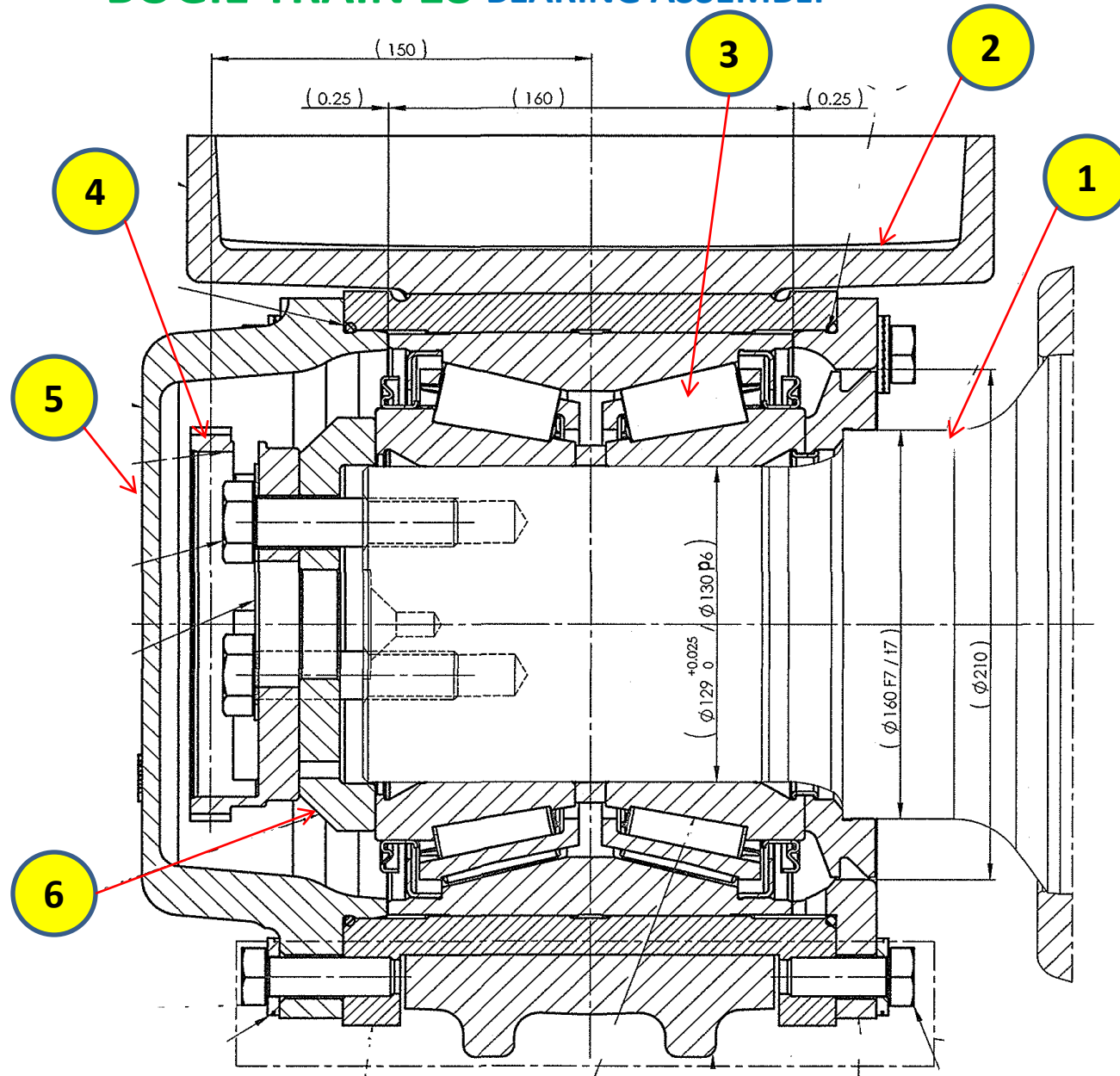


WHEEL AND AXLE ASSEMBLY

- WHEEL PRESS FITTING PRESSURE 79 T to 131 T
- DIFFERENCE IN DIA OF WHEELSET IN SAME AXLE MAX 0.5 mm
- DIFFERENCE IN DIA OF WHEELSET AXLE TO AXLE MAX 1.0 mm
- DIAMETER OF NEW WHEELSET Ø 952 mm
- DIAMETER OF CONDEMNED WHEELSET Ø 877 mm



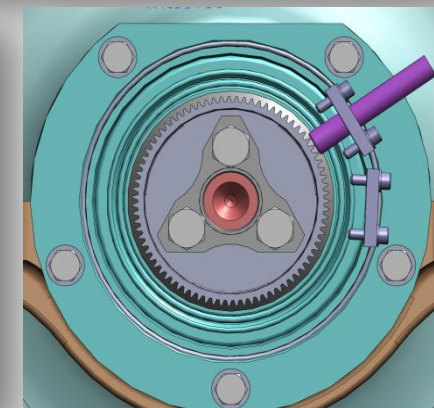
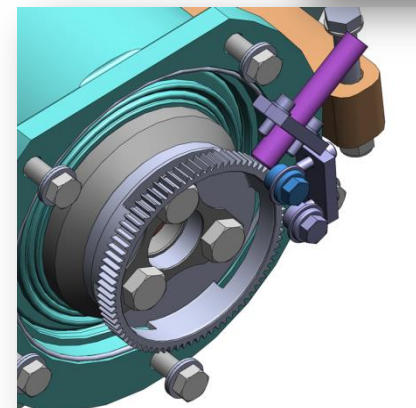
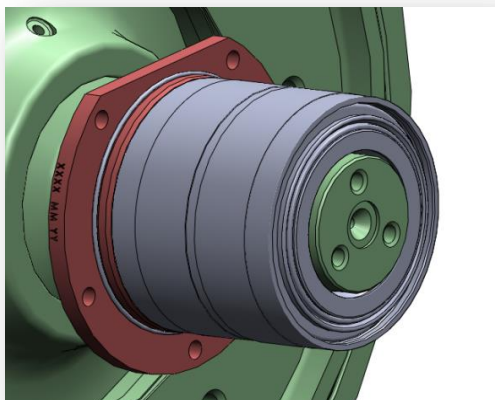
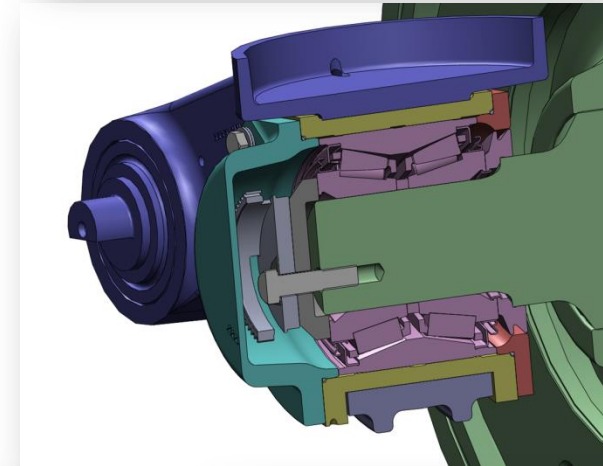
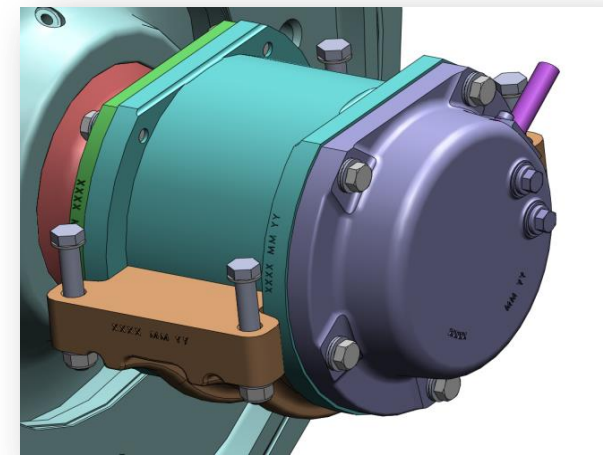
BOGIE TRAIN 18 BEARING ASSEMBLY



- 1. AXLE
- 2. SPRING SEAT
- 3. ROLLER BEARING
- 4. PHONIC WHEEL
- 5. FRONT COVER
- 6. SECURITY CUP

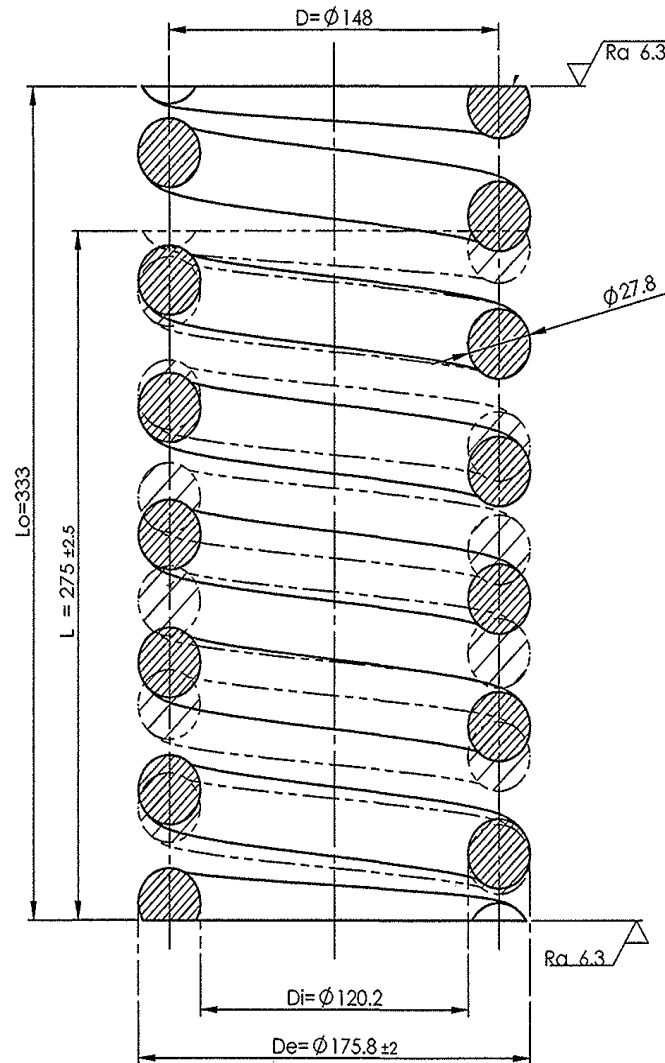
AXLE BOX

- CATRIDGE TYPE ROLLER BEARING OF TIMKEN MAKE PROVIDED
- ADAPTOR FOR DUAL SPEED SENSOR IS PROVIDED IN THE FRONT COVER.
- PHONIC WHEEL AND SPEED SENSORS ARE SUPPLIED BY KNORR BREMSE or Ms/ MEDHA.
- INTERLOCK WASHERS TO BE USED ALL THE SCREWS AND BOLTS
- SCREWS AND BOLTS TO BE USED OF TVS MAKE.
- THREAD AND BEARING SURFACE OF BOLTS SHOULD BE APPLIED WITH ANTI SEIZE COMPOUND LIKE ANABOND.



PRIMARY HELICAL SPRING INNER

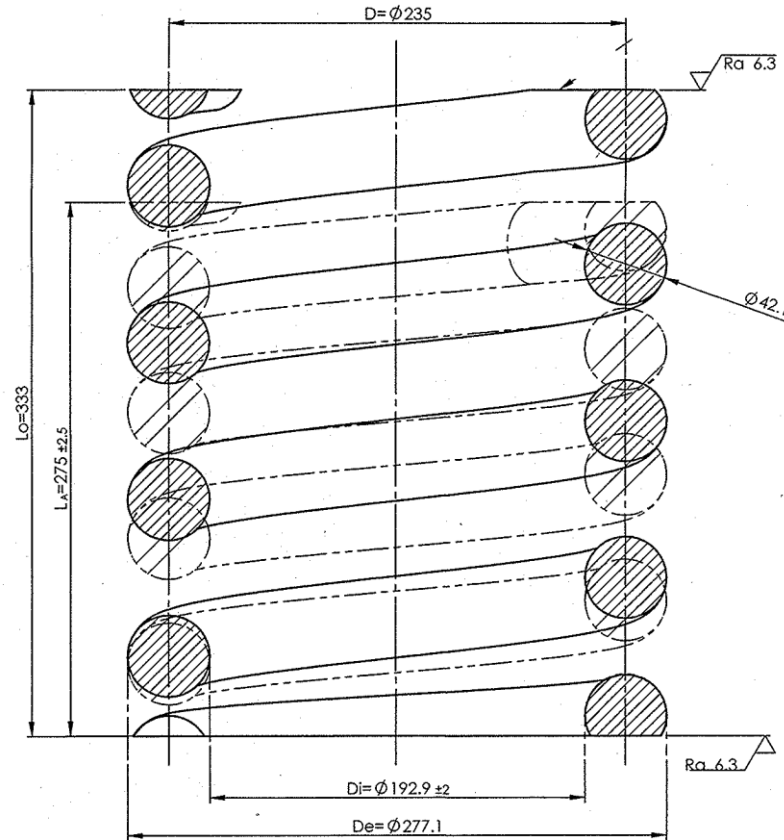
DESIGN AND MANUFACTURING DATA



- BAR DIA (d) 27.8 mm
- LENGTH OF STRAIGHT BAR (L) 3500 mm
- DIRECTION OF WINDING RIGHT
- MEAN DIA OF COIL (D) 148 mm
- TOTAL NUMBER OF COIL (n') 7.5
- ACTIVE COIL (n) 6
- FREE LENGTH OF SPRING (L₀) 333 mm
- SOLID LENGTH OF SPRING (L_c) 201 mm
- MAX. ALLOWABLE DEFLECTION 132 mm

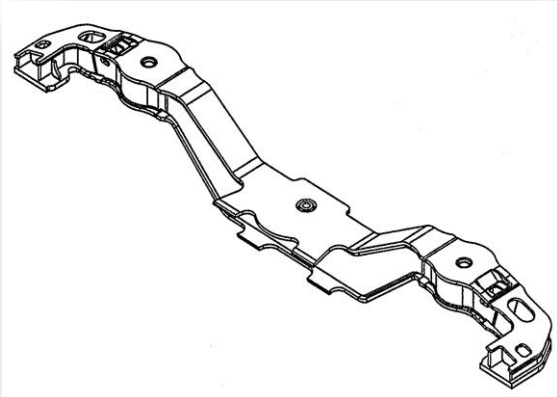
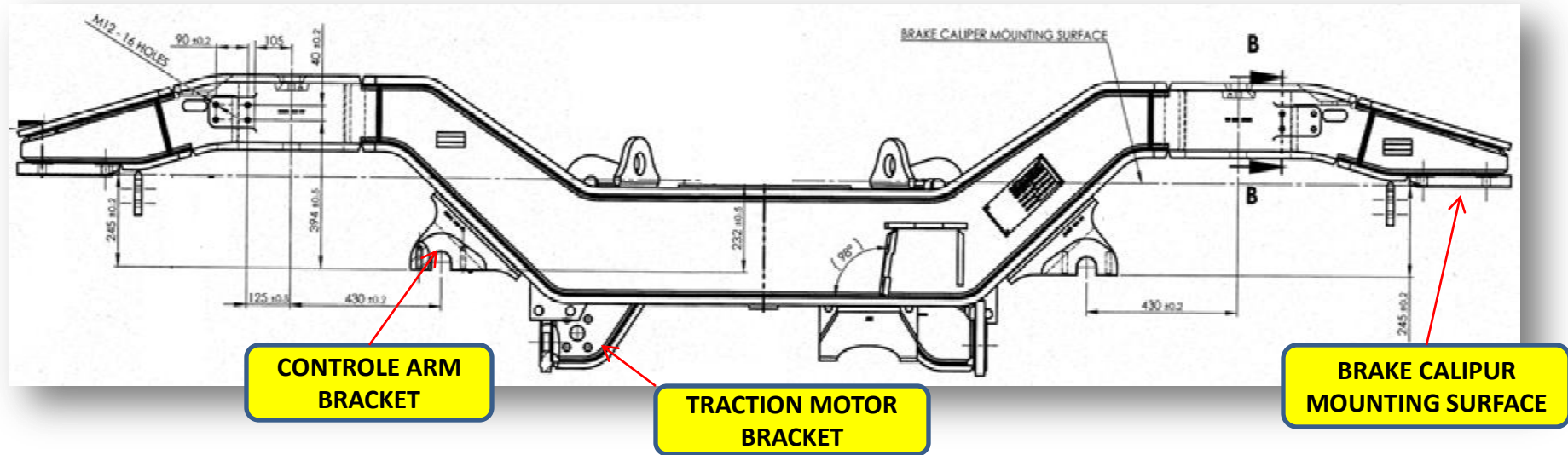
HELICAL SPRING OUTER PRIMARY

DESIGN AND MANUFACTURING DATA



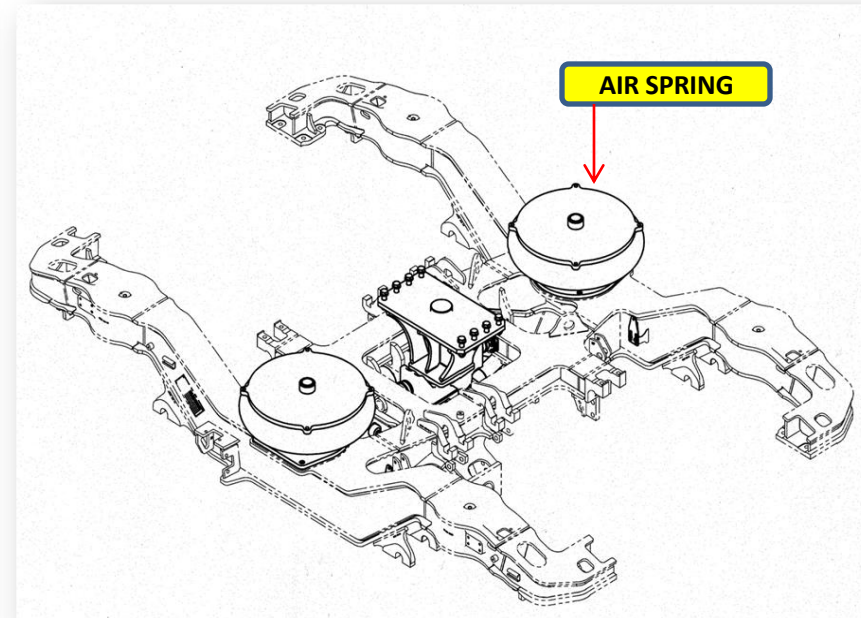
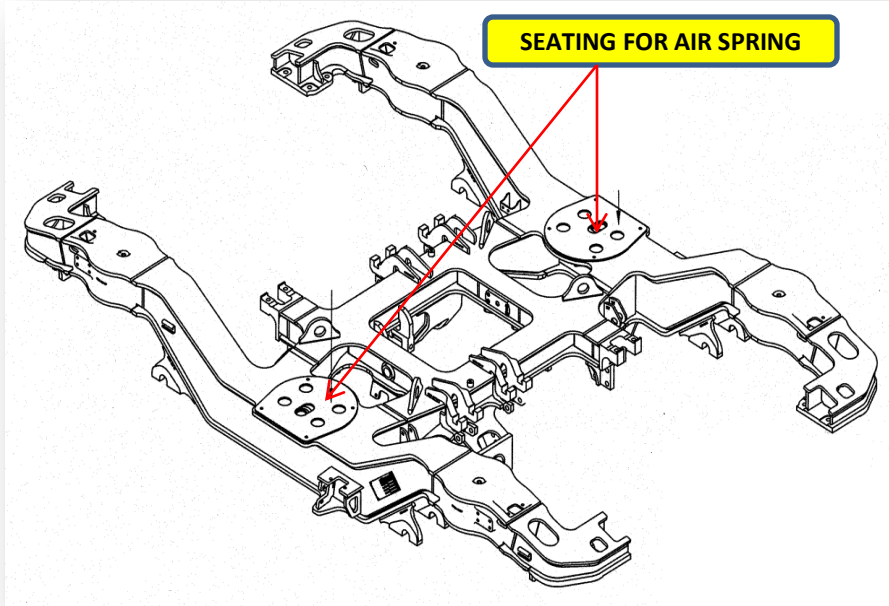
- BAR DIA (d) 42.1 mm
- LENGTH OF STRAIGHT BAR (L) 3780 mm
- DIRECTION OF WINDING LEFT
- MEAN DIA OF COIL (D) 235 mm
- TOTAL NUMBER OF COIL (n') 5.1
- ACTIVE COIL (n) 3.6
- FREE LENGTH OF SPRING (L_0) 333 mm
- SOLID LENGTH OF SPRING (L_c) 203 mm
- MAX. ALLOWABLE DEFLECTION 130 mm

TRAIN 18 BOGIE -FRAME



- Y-SHAPE FRAME
- BOX SECTION WITH 16 mm PLATE
- WITHOUT HEAD STOCK

SECONDARY SUSPENSION TRAIN 18

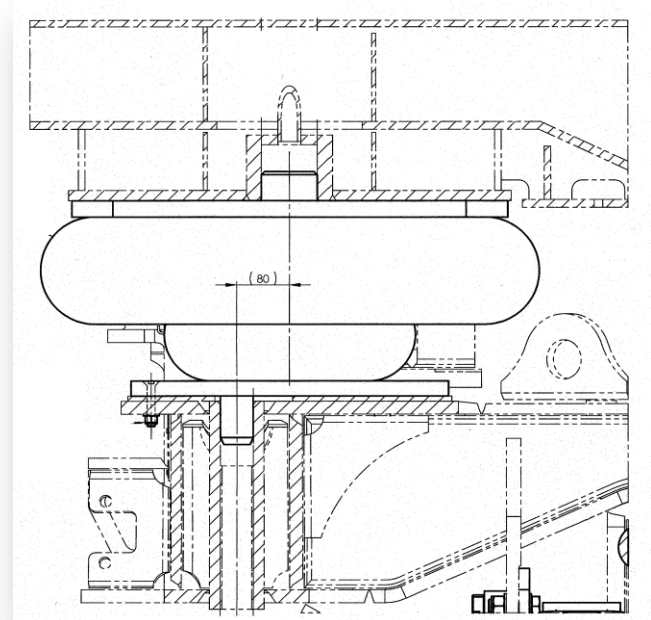
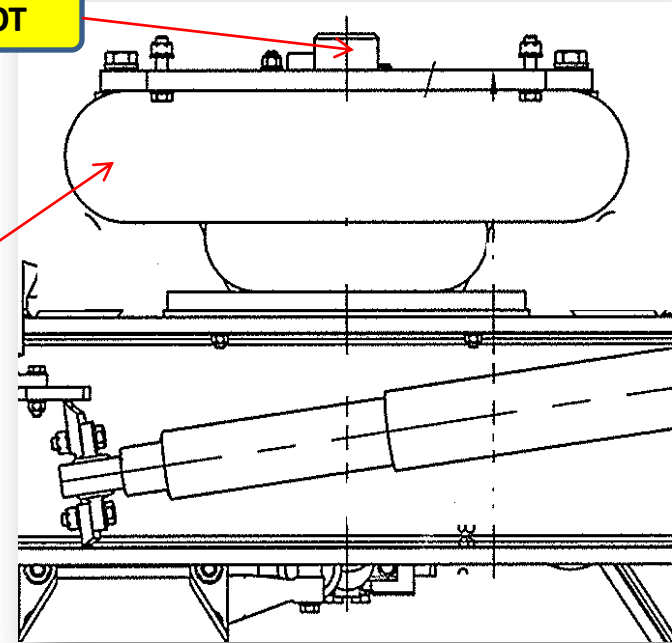


BOGIE TRAIN 18 SECONDARY SUSPENSION

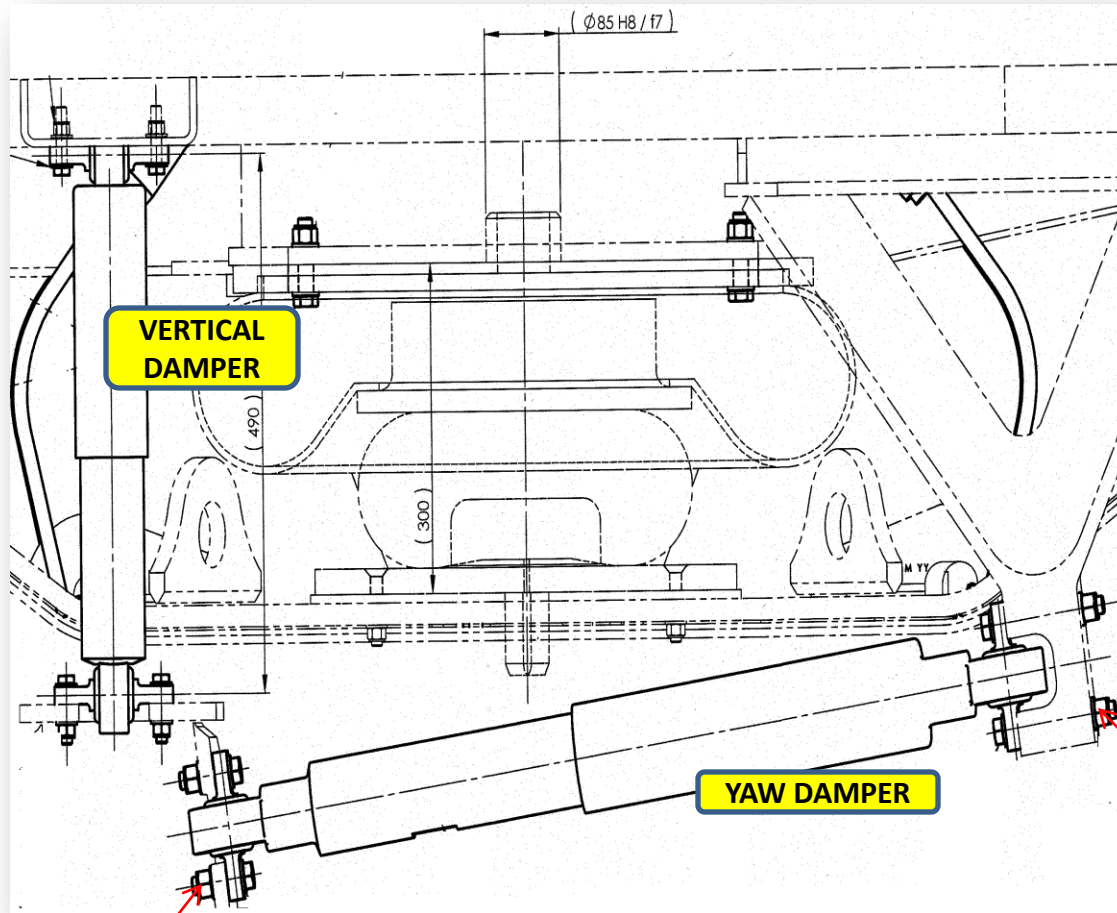
- SPIGOT THROUGH WHICH AIR IS SUPPLIED TO THE AIR SPRING
- SPRING TIGHTED WITH A TORQUE OF 192NM WITH M16 BOLT
- AIR SPRING OF RESISTOFLEX MAKE OF CAPACITY 160 KN

AIR BELLOW

SPIGOT



BOGIE TRAIN 18 VERTICAL DAMPER AND YAW DAMPER ASSEMBLY



VERTICAL
DAMPER

YAW DAMPER

M16×60 BOLT
WITH NUT

M16×130 BOLT
WITH NUT

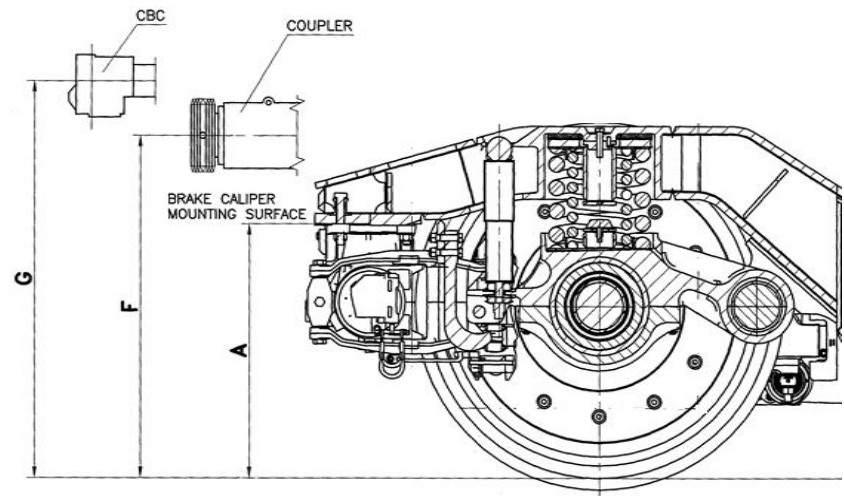
- VERTICAL DAMPER AND YAW DAMPER SHOULD BE ASSEMBLED AFTER LOWERING THE SHELL OVER THE BOGIE.
- DAMPERS OF M/s ZF MAKE 
- M16 BOLT TIGHTENING TORQUE 192 NM

BOGIE WEIGHT AND LOADING PARAMETERS

TYPE OF COACH	TARE WEIGHT OF COACH	WEIGHT OF EACH BOGIE	UNSPRUNG MASS PER BOGIE	NORMAL PAY LOAD	OVER LOAD	TOTAL PAY LOAD	GROSS WEIGHT OF COACH
	IN TONNES	IN TONNES	IN TONNES	IN TONNES	IN TONNES	IN TONNES	IN TONNES
TRAIN18/DTC/AC	50.534	7.790	3.910	4.375 (53x80kg+135kg)	1.040 (13x80kg)	5.415	55.949
TRAIN18/MC/AC	57.611	11.114	4.910	6.400 (78+2)x80kg	2.080 (26x80kg)	8.480	66.091
TRAIN18/TC/AC	55.576	7.790	3.910	6.400 (78+2)x80kg	2.080 (26x80kg)	8.480	64.056
TRAIN18/NDTC/AC	50.885	7.790	3.910	6.400 (78+2)x80kg	2.080 (26x80kg)	8.480	59.365
TRAIN18/MC/EC/AC	57.546	11.114	4.910	4.320 (52+2)x80kg	2.080 (26x80kg)	6.400	63.946
TRAIN18/NDTC/EC/AC	50.820	7.790	3.910	4.320 (52+2)x80kg	2.080 (26x80kg)	6.400	57.220



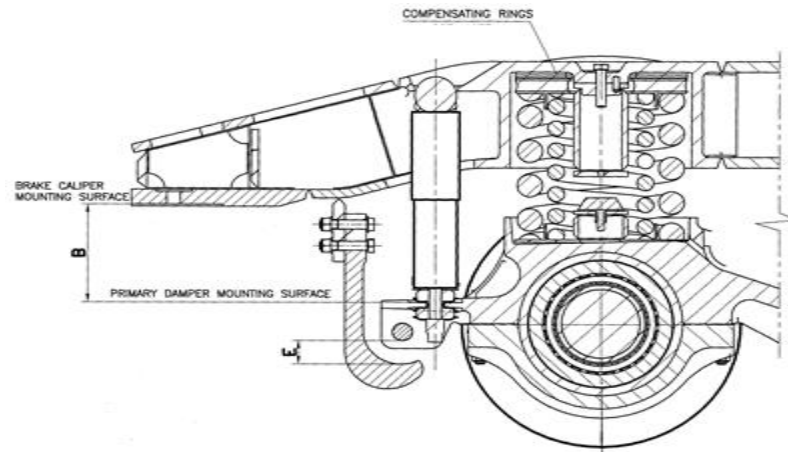
LOAD TESTING PARAMETERS



TYPE OF COACH	BRAKE CALIPER MOUNTING SURFACE FROM RL	COUPLER HEIGHT	CBC COUPLER HEIGHT (FOR DRIVING END OF DTC ONLY)
	A IN mm	F IN mm	G IN mm
TRAIN18/DTC/AC	DE 701 ⁺³ 694 ⁺³	—	1105 ⁺⁰ 1098 ⁺⁸
	NDE 701 ⁺³ 692 ⁺³	940 ⁺⁰ 931 ⁺⁸	—
TRAIN18/MC/AC	701 ⁺³ 689 ⁺³	940 ⁺⁰ 928 ⁺⁸	—
	701 ⁺³ 689 ⁺³	940 ⁺⁰ 928 ⁺⁸	—
TRAIN18/TC/AC	701 ⁺³ 689 ⁺³	940 ⁺⁰ 928 ⁺⁸	—
	701 ⁺³ 689 ⁺³	940 ⁺⁰ 928 ⁺⁸	—
TRAIN18/NDTC/AC	701 ⁺³ 689 ⁺³	940 ⁺⁰ 928 ⁺⁸	—
	701 ⁺³ 689 ⁺³	940 ⁺⁰ 928 ⁺⁸	—
TRAIN18/MC/EC/AC	701 ⁺³ 692 ⁺³	940 ⁺⁰ 931 ⁺⁸	—
	701 ⁺³ 692 ⁺³	940 ⁺⁰ 931 ⁺⁸	—

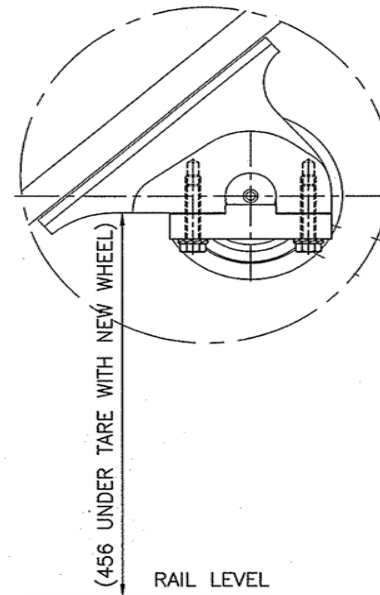
- Dimension **A** shall be maintained by adding or removing shims as required.
- Dimension **F & G** shall be maintained after giving air connection to air spring equipment.

LOAD TESTING PARAMETERS

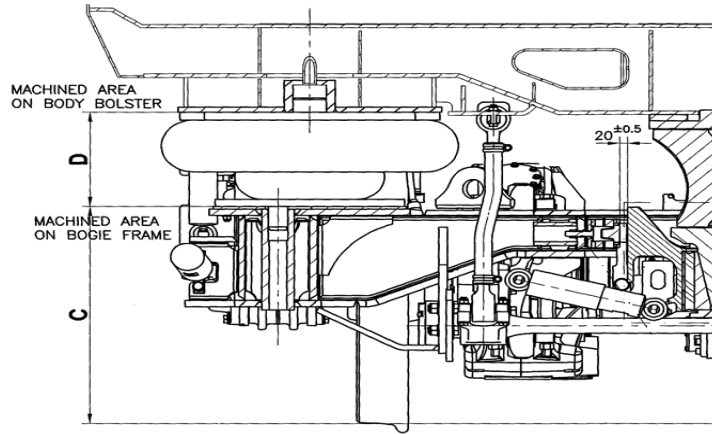


TYPE OF COACH

		B		E	
		IN	mm	IN	mm
TRAIN18/DTC/AC	DE	185	±1	44	±2
		178	±1	51	±2
TRAIN18/MC/AC	NDE	185	±1	44	±2
		176	±1	53	±3
TRAIN18/TC/AC		185	±1	44	±2
		173	±1	56	±2
TRAIN18/NDTC/AC		185	±1	44	±2
		173	±1	56	±2
TRAIN18/MC/EC/AC		185	±1	44	±2
		176	±1	53	±2
TRAIN18/NDTC/EC/AC		185	±1	44	±2
		176	±1	53	±2



LOAD TESTING PARAMETERS



- Lateral clearance of 20 mm shall be ensured after adding or removing shims as required

TYPE OF COACH		C		D	
		IN mm		IN mm	
TRAIN18/DTC/AC	DE	688 ⁺³	300 ⁺⁵	688 ⁺³	300 ⁺⁵
		681 ⁺³	300 ⁺⁵	681 ⁺³	300 ⁺⁵
	NDE	688 ⁺³	300 ⁺⁵	688 ⁺³	300 ⁺⁵
		679 ⁺³	300 ⁺⁵	679 ⁺³	300 ⁺⁵
TRAIN18/MC/AC		688 ⁺³	300 ⁺⁵	688 ⁺³	300 ⁺⁵
		676 ⁺³	300 ⁺⁵	676 ⁺³	300 ⁺⁵
TRAIN18/TC/AC		688 ⁺³	300 ⁺⁵	688 ⁺³	300 ⁺⁵
		676 ⁺³	300 ⁺⁵	676 ⁺³	300 ⁺⁵
TRAIN18/NDTC/AC		688 ⁺³	300 ⁺⁵	688 ⁺³	300 ⁺⁵
		676 ⁺³	300 ⁺⁵	676 ⁺³	300 ⁺⁵
TRAIN18/MC/EC/AC		688 ⁺³	300 ⁺⁵	688 ⁺³	300 ⁺⁵
		679 ⁺³	300 ⁺⁵	679 ⁺³	300 ⁺⁵
TRAIN18/NDTC/EC/AC		688 ⁺³	300 ⁺⁵	688 ⁺³	300 ⁺⁵
		679 ⁺³	300 ⁺⁵	679 ⁺³	300 ⁺⁵



SECONDARY SUSPENSION ASSEMBLY LIST OF ITEMS

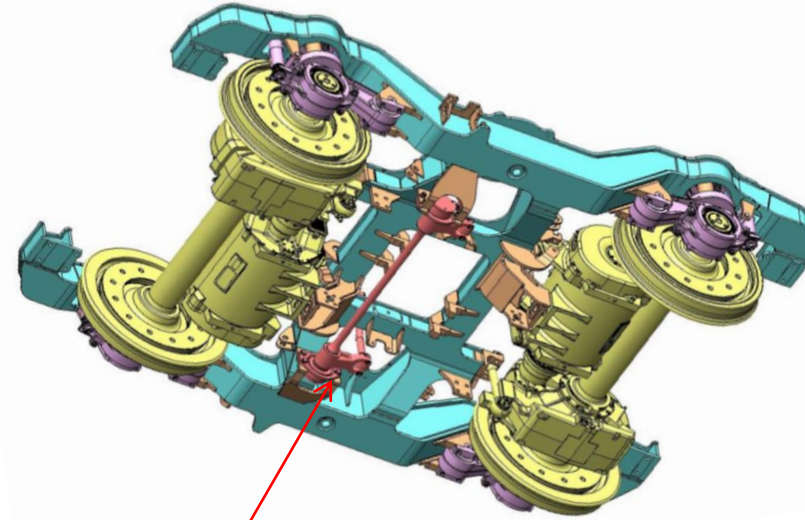
- ADAPTOR ASSEMBLY
- LATERAL SHOCK ABSORBER ASSEMBLY
- CENTER PIVOT ARRANGEMENT
- ADJUSTABLE PLATE ASSEMBLY
- AIR SPRING ASSEMBLY
- STABLIZER ASSEMBLY

SECONDARY SUSP. ARRGT. STAGE 1 TORQUE RANGE FOR FOLLOWING BOLTS AND NUTS		
SL.NO.	SIZES	TIGHTING TORQUE VALVE
1	M 8-8.8	29 NM
2	M10 - 10.9	50 NM
3	M10 - 10.9	57 NM
4	M12 - 10.9	65 NM
5	M12 - 10.9	80 NM
6	M16 - 10.9	106 NM
7	M20 - 10.9	508 NM
8	M22 - 10.9	692 NM
9	M24 - 10.9	815 NM

SL.NO.	DESCRIPTION	QTY/BOGIE
I	ADAPTOR ASSEMBLY	
1	SIDE BUMPER	2
2	SHIM	6
3	FS ALL STEEL LOCK NUT M16	2
4	WASHER M16 - 300	2
5	PARALLEL PIN	2
6	HEX. HD. SCREW M10x25 - 10.9	8
7	INTERLOCK WASHER M10	8
II	LATERAL SHOCK ABSORBER ASSEMBLY	
1	LATERAL SHOCK ABSORBER	2
2	HEX. HD. BOLT M12x50 -10.9	4
3	HEX. HD. BOLT M12x55 -10.9	4
4	FS ALL STEEL NUT M12 - 300 HV	16
III	CENTER PIVOT ARRANGEMENT	1
	TRACTION CENTER ASSEMBLY	1
IV	TRACTION BAR COMPLETE	
1	TRACTION BAR	2
2	HEX. HD. BOLT M22x110 -10.9	4
3	HEX. HD. BOLT M22x140 -10.9	4
4	WASHER M22 - 300	16
5	FS ALL STEEL NUT M22 - 300 HV	8
V	ADJUSTABLE PLATE ASSEMBLY	
1	ADJUSTABLE PLATE	2
2	HEX. HD. SCREW M10x30 - 10.9	4
3	WASHER M10 - 300	8
4	FS ALL STEEL NUT M10 - 300 HV	4
VI	AIR SPRING ASSEMBLY	
1	AIR SPRING	2
2	HEX. SOCKET CSK HD. SCREW M12x70	8
3	WASHER M12 - 300	24
4	FS ALL STEEL NUT M12 - 300 HV	16
VII	STABILISER ASSEMBLY	
1	STABILISER	1
2	HEX. HD. SCREW M20x65 - 10.9	8
3	WASHER M20 - 300	16
4	FS ALL STEEL NUT M20 - 300 HV	8

DESIGN FEATURE

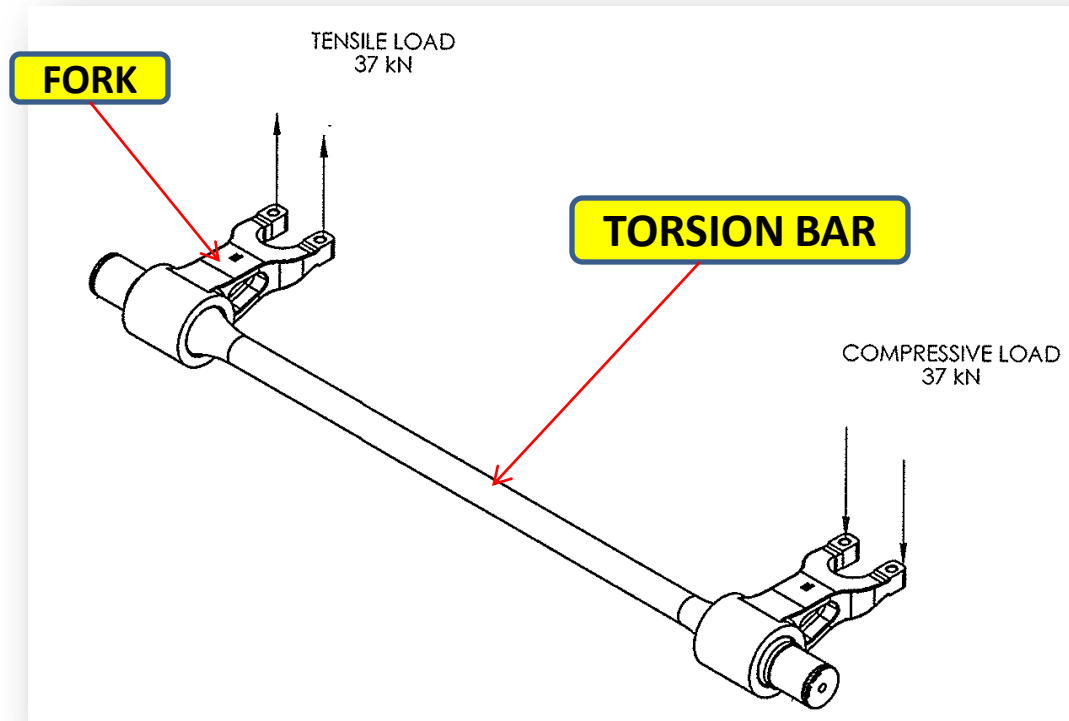
- **STABILIZER (ANTI -ROLL BAR) MECHANISM FOR BETTER PASSENGER COMFORT.**
- ❑ The anti-roll bar arrangement consists of a torsion bar fixed between bearings attached to the bogie frame.
- ❑ Two arms are rigidly fixed at the ends of the torsion bar and these are in turn connected to the transfer beam (Bolster) through links.
- ❑ When the coach rolls, the two ends of the transfer beam are at different heights.
- ❑ The two links move the arms in the opposite direction, thus twisting the torsion bar.
- ❑ The torsion bar provides the restoring force.



ANTI-ROLL BAR

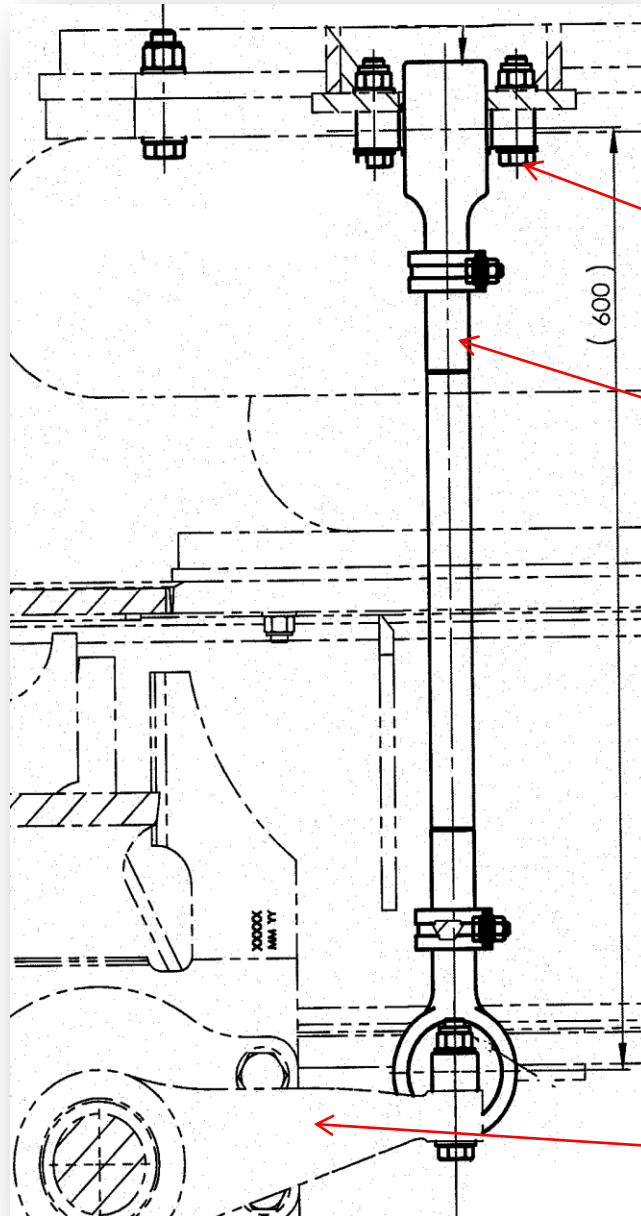


BOGIE TRAIN 18



- 2% OF THE ASSEMBLY TESTED WITH A LOAD OF 37KN
- LEVER ASSEMBLED BY SHRINK FIT BY HEATING TO 350°C

BOGIE TRAIN 18 STABLIZER LEVER ASSEMBLY



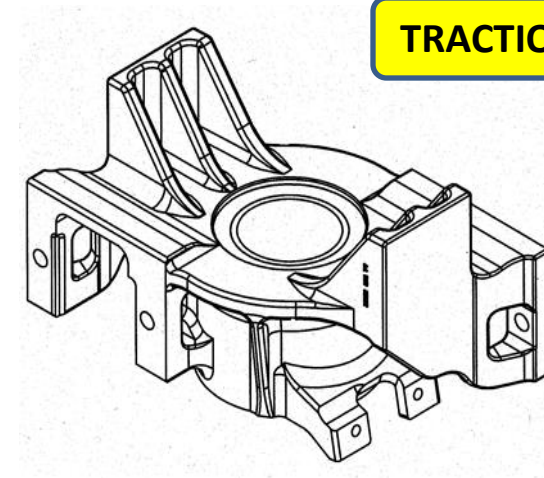
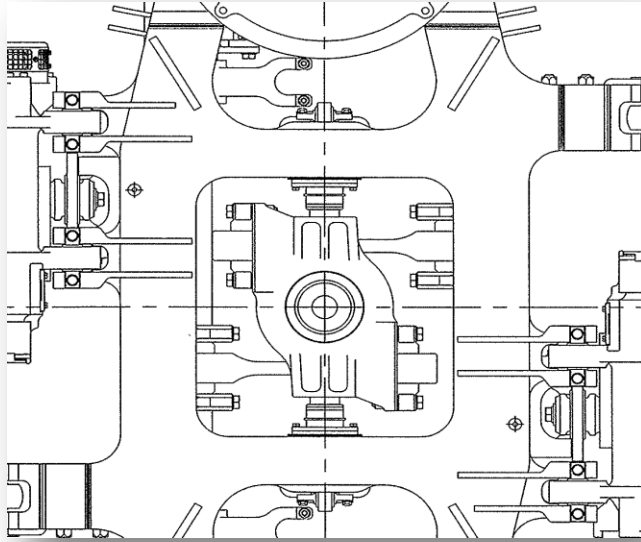
M14×60 BOLT
WITH LOCK NUT

STABLIZER LEVER

FORK

- STABLIZER LEVER OF M/s GMT MAKE
- M16 BOLT TORQUE 174 NM

BOGIE TRAIN 18 TRACTION CENTRE ASSEMBLY

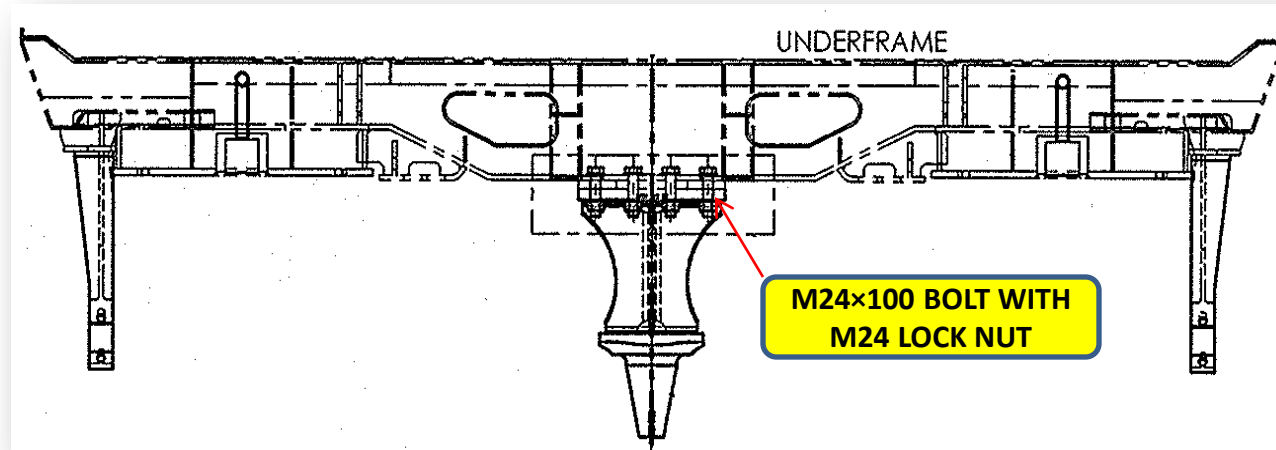


TRACTION CENTRE

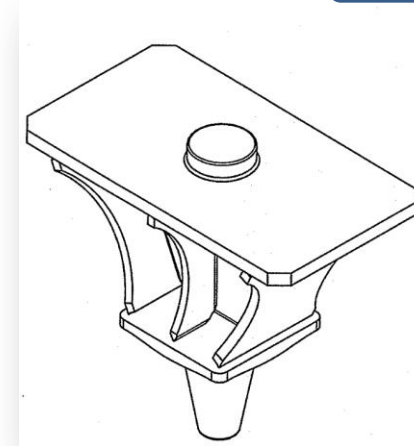
- AFTER LOWERING COACH OVER BOGIE, TRACTION CENTRE IS PUSHED UP TO ENGAGE WITH CP PIN.
- SUITABLE JACK MAY BE USED FOR THIS PURPOSE



CENTRE PIVOT PIN ASSEMBLY



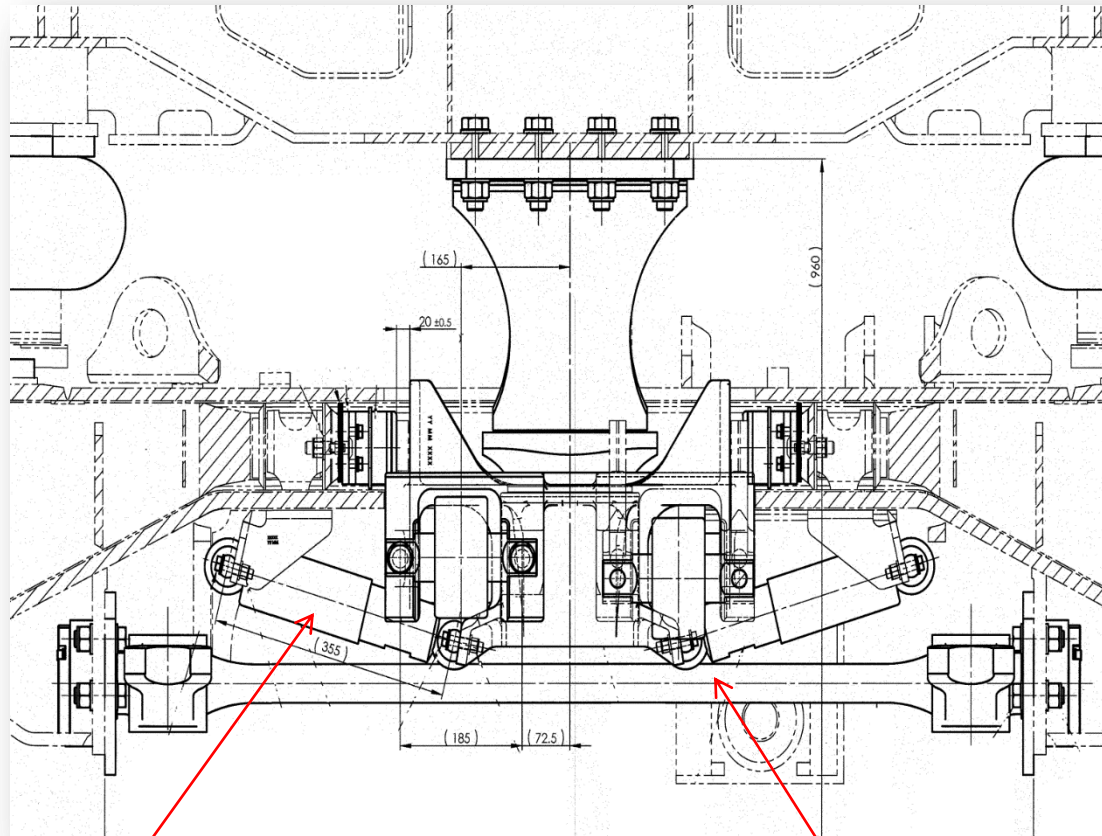
CP PIN



- CP PIN ASSEMBLED WITH UNDER FRAME BODY BOLSTER
- M24 NUT TIGHTENING TORQUE 815NM
- BOLT AND WASHER OF MAKE TVS/UNBRAKO/LPS
- UNPAINTED EXPOSED SURFACE MUST APPLIED RUST PREVENTIVE



CP PIN LATERAL DAMPER AND STABILIZER LEVER ASSEMBLY

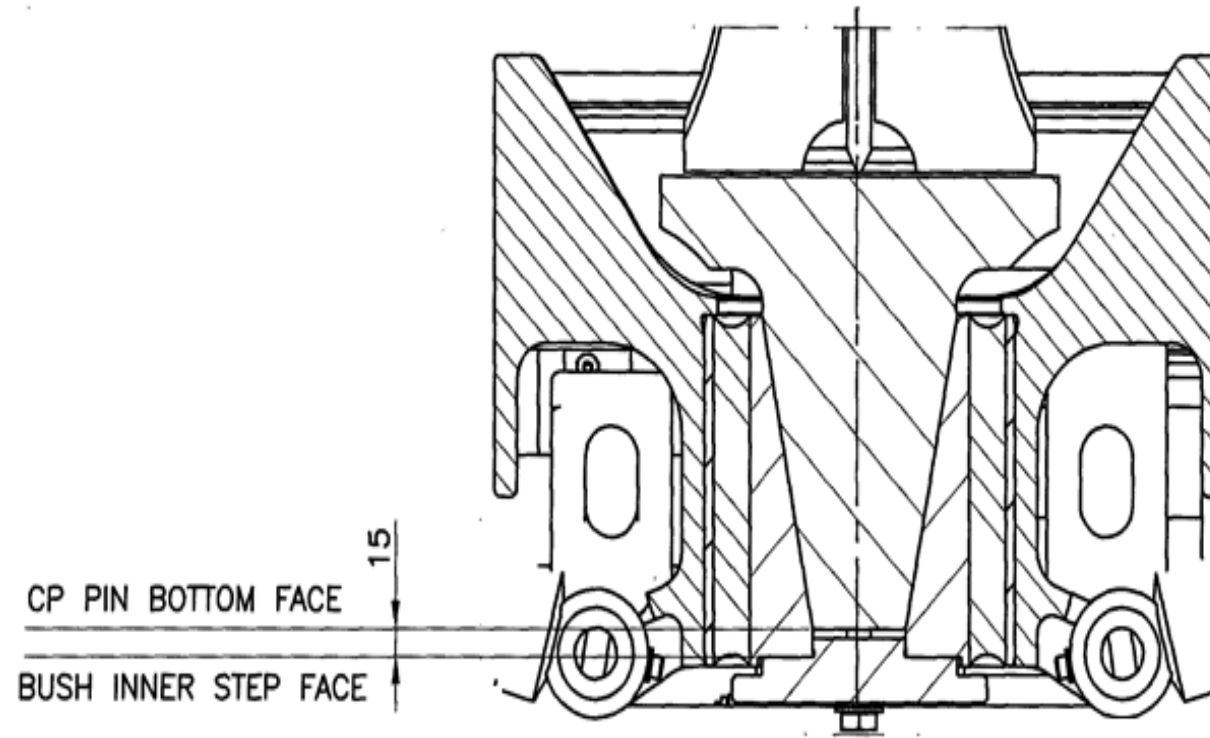


**LATERAL SHOCK
ABSORBER**

TORSION BAR

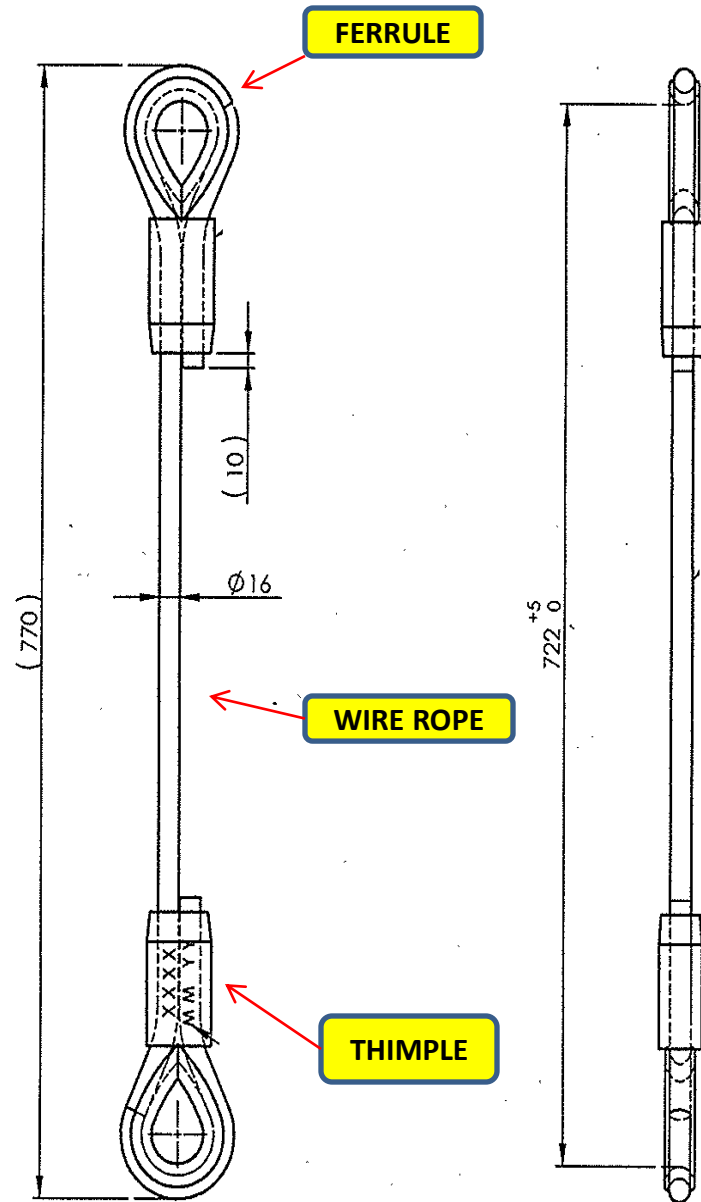
**CP PIN BOTTOM
COVER**

- LATERAL SHOCK ABSORBER ASSEMBLED WITH M12×55 TIGHTENING WITH A TORQUE OF 80 NM.
- TORSION BAR ASSEMBLY ASSEMBLED WITH M20×65 TIGHTENED WITH TORQUE 508 NM



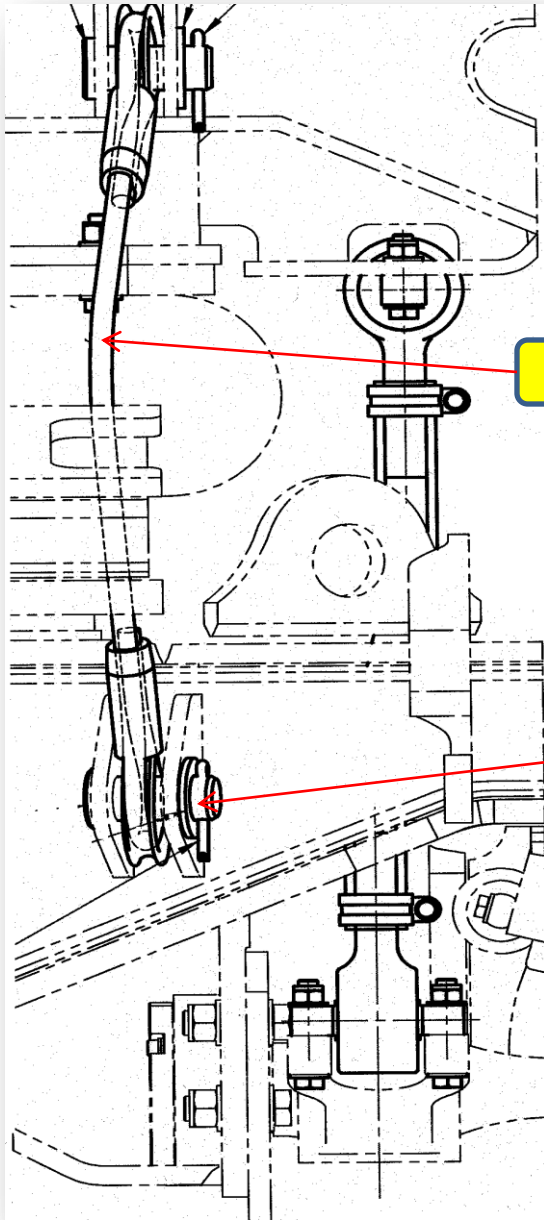
- After lowering the coach over bogie traction centre shall be pushed upward to engage with CP PIN

WIRE ROPE ARRANEMENT FOR BOGIE BODY CONNECTION



- WIRE ROPE NOMINAL DIA 16 mm.
- MAXIMUM BREAKING LOAD OF WIRE ROPE OF 140 KN.

WIRE ROPE ARRANEMENT FOR BOGIE BODY CONNECTION



WIRE ROPE

PIN WITH SPLIT
COTTER

- WIRE ROPE IS AASSEMBLED WITH PIN AND COTTER JOINT
- ASSEMBLED AFTER LOWERING OF SHELL OVER THE BOGIE

THANK YOU

SALIENT FEATURES OF LHB BOGIE

- DEVELOPED & BUILT BY FIAT, SWITZERLAND
- SIMILAR TO IR-20 BOGIE
- HIGHER CARRYING CAPACITY
- BETTER PAY LOAD AND TARE RATIO
- LESS PRON TO CORROSION
- LOW MAINTANANCE
- DISC BRAKE SYSTEM
- ARTICULATED ARM WITH COIL SPRING IN PRIMARY SUSPENSION
- FLEXI COIL SPRING IN PRIMARY & SECONDARY SUSPENSION
- ANTI ROLLER BAR INCORPORATED
- H-TYPE WELDED FRAME
- DAMPER AT SECONDARY & PRIMARY SUSPENSION
- WHEEL BASE 2560 mm
- INTRODUCED IN INDIAN RAILWAYS IN 2001 (24 COACH SETS IMPORTED FROM SWITZERLAND)
- CURRENTLY PRODUCED IN RAIL COACH FACTORY,KAPURTHALA



IMPORTANT PARAMETERS OF FIAT BOGIE

- Length of bogie 3534 mm
- With of bogie 3030 mm
- Weight of bogie 6.3 ton
- Wheel base 2560 mm
- Wheel diameter 915 mm
- Wheel diameter (condemn) 845 mm
- Break disc diameter 640 mm
- Wheel gauge 1676 mm
- Speed potential 160 to 200KMPH
- Break cylinder size 10"
- Piston stroke 21 mm

CROSS SECTION ASSEMBLY



➤ CONTROL LONGITUDINAL AND LATERAL MOVEMENT



ANTI ROLL BAR ASSEMBLY



- HEAT BORE OF THE FORK TO A TEMPERATURE OF 231°C
- PRESSING OF FORK ON FORK SEAT OF ANTI ROLL BAR



ANTI ROLL BAR

TRACTION CENTRE ASSEMBLY

TRACTION
CENTRE

