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भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226011
Government of India - Ministry of
Railways
Research, Designs & Standards
Organization, LUCKNOW -
226011

सं० ईएल/3.2.13/6

दिनांक: 20.07.2010
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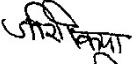
- वरिष्ठ मंडल विद्युत अभियन्ता (कचस) / विद्युत लोको शेड,
1-पूर्व मध्य रेलवे, मुगलसराय-232 101
2-पूर्व मध्य रेलवे, गोमो-828 401
3-आसनसोल-713 310
4-पूर्व तटिय रेलवे, पी.ओ. तुरंगा, जिला-अंगुल-759 122
5-उत्तर मध्य रेलवे, फजलगंज, कानपुर-208 003
6-उत्तर रेलवे, लुधियाना (पंजाब)
7-उत्तर-मध्य रेलवे, झांसी-204 001 (उ.प्र.)
8-पश्चिम मध्य रेलवे, तुगलकाबाद, नई दिल्ली-110 044
9-पश्चिम मध्य रेलवे, न्यू कटनी जंक्शन, कटनी (मध्य प्रदेश)
10-दक्षिण रेलवे, इरोड-638 002
11-दक्षिण मध्य रेलवे, लालागुडा, सिकंदराबाद-500 017
12-दक्षिण मध्य रेलवे, विजयवाड़ा-520 009
13-दक्षिण पूर्व रेलवे, टाटानगर-831 002
14-दक्षिण पूर्व रेलवे, सांत्रागाची, हावड़ा-711 311
15-दक्षिण पूर्व रेलवे, बन्डामुन्डा, राउरकेला-770 032
16-दक्षिण पूर्व मध्य रेलवे, बीएमवाई काम्पलेक्स, भिलाई दुर्ग-490 025
17-मध्य रेलवे, अजनी, नागपुर-440 008
18-मध्य रेलवे, भुसावल-425 201
19-मध्य रेलवे, कल्याण (महाराष्ट्र)

विषय: एस.एम.आइ. न. आर.डी.एस.ओ./2010/इ.एल./एस.एम.आइ./0264(रिवी.0)
दिनांक: 15.07.2010

उपर्युक्त विषय में इस कार्यालय का दिनांक: 20.07.2010 का समसंख्यक पत्र आवश्यक कार्यवाही हेतु संलग्न है ।

संलग्नक: यथोक्त ।


(सी.बी.सिंह)
कृते महानिदेशक/विद्युत


26-7-10

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भारत सरकार - रेल मंत्रालय
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लखनऊ - 226011
Government of India - Ministry of
Railways
Research, Designs & Standards
Organization, LUCKNOW - 226011

No. EL/3.2.13/6

Dated 20.07.2008

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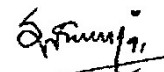
Sr. Divisional Electrical Engineer (TRS), Electric Loco Shed,

1. East Central Railway, Mughalsarai - 232 101
2. East Central Railway, Gomoh - 828 401
3. Eastern Railway, Asansol - 713 310
4. East Coast Railway, P.O. Turanga, Dist. Angul - 759122
5. North Central Railway, Fazalganj, Kanpur - 208 003
6. Northern Railway, Ludhiana.
7. North Central Railway, Jhansi- 284 001
8. West Central Railway, Tughlakabad. New Delhi - 110 044
9. West Central Railway, New Katni Junction, Katni
10. Southern Railway, Erode - 638 002.
11. South Central Railway, Lallaguda, Secunderabad - 500 017.
12. South Central Railway, Vijayawada - 520 009
13. South Eastern Railway, Tatanagar - 831 002.
14. South Eastern Railway, Santraghanchi, Howrah- 711 311.
15. South Eastern Railway, Bondamunda, Rourkela - 770 032.
16. South East Central Railway, BMY Complex, Bhilai, Durg-490 025.
17. Central Railway, Ajni, Nagpur - 440 008.
18. Central Railway, Bhusaval - 425 201.
19. Central Railway, Kalyan (Maharashtra)

Sub: SPECIAL MAINTENANCE INSTRUCTION No.
RDSO/2010/EL/SMI/0264 (Rev. '0') Dated: 15.07.2010

Enclosed, please find copy of SPECIAL MAINTENANCE INSTRUCTION No. RDSO/2010/EL/SMI/0264 (Rev. '0') Dated: 15.07.2010 Use and Maintenance/Fitment Practices of Equalizer & Compensating Beam Pins, Bushes & Cotters in WAG7 Locomotives, along with drawings SKEL- 4777 (Alt '0') dated June 2010 and SKVL- 703 (Alt '0') dated June 2010.

DA: As above


(Ishaq Khan)
for Director General

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सत्यमेव
जयते

भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226011
Government of India - Ministry of Railways
Research, Designs & Standards Organization,
LUCKNOW - 226011

No. EL/3 2.13/6

Dated: 15.07.2010

181353

Chief Electrical Engineer,

1. Central Railway, Mumbai - 400 001
2. East Central Railway, Hazipur - 844 101
3. East Coast Railway, Chandrashekharapur, Bhubaneswar - 751 016
4. Eastern Railway, Fairlie Place, Kolkata - 700 001
5. North Central Railway, Subedargang, Allahabad - 211 001
6. Northern Railway, Baroda House, New Delhi - 110 001
7. South Central Railway, Secunderabad - 500 071
8. South East Central Railway, Bilaspur - 495 004
9. South Eastern Railway, Garden Reach, Kolkata - 700 043
10. Southern Railway, Park Town, Chennai - 600 003
11. West Central Railway, Jabalpur - 482 001
12. Western Railway, Churchgate, Mumbai - 400 020
13. Chittaranjan Locomotive works, Chittaranjan - 713 331

SPECIAL MAINTENANCE INSTRUCTION No. RDSO/2010/EL/SMI/0264 (Rev. '0')

Dated: 15.07.2010

1.0 Title :

Use and Maintenance/Fitment Practices of Equalizer & Compensating Beam Pins, Bushes & Cotters in WAG7 Locomotives.

IMPORTANT - The maintenance instructions given in this SMI supersedes all the earlier modifications issued by Motive Power Dte and Electrical Dte RDSO. They are given below:-

1. MP Dte.'s Drg. No. SKVL-139 (Alt 1 to 9)
2. MP Dte.'s Modification sheet No. MP.MOD-VL.02.09.02 (Rev. '0' to Rev. '2')
3. Electrical Dte.'s Modification sheet No. WAG7/5 of Jan'98
4. Electrical Dte.'s Modification sheet No. WAG7/8 of April'98
5. Electrical Dte.'s Modification sheet No. ELRS/MS/0307/2001 (Rev. '0') of Sept.'01 & Drg. No. SKEL/4601, 4602 & 4603
6. Electrical Dte.'s Modification sheet No. ELRS/MS/0331/2004 (Rev. '0') of Nov.'04
7. Use of Polyamide Bush vide RDSO letter no. EL/3.2.13/6 dated 03.01.08

2.0 Brief History

- 2.1 The suspension arrangement of high adhesion bogies in WAG7 locomotives were developed in 1990 which was identical to the design of WAG6C imported locomotives. Originally, the RDSO Drg. No. SKDL- 4187 was made. The identical arrangement was introduced in Diesel Locomotives type WDG-2. MP Directorate RDSO have issued drawing no. SKVL-139 Rev '0' in Dec'97. Since then total 9 alterations have been issued for the drawings upto march'10. Also, MP Dte./RDSO have issued Modification Sheet No. VL.02.09.02 Rev '0' dt. 13-8-02, in which the modified lubricating arrangement of pins and fitment of pins from rear side i.e. the head of the pins are on back side was issued. Later on, Rev.1 and Rev.2 were issued on this subject. This was done as per the problems of fitment reported by Railways. The IS standard 2638B for flat split cotter of the size 6x20x120 mm was given. The SKVL139 drawing was revised for a total 9 times i.e. alteration-1 to the latest alteration-9 in March'10. The several changes in the design and fitment arrangement such as; single and double cotters, head in front / rear, length of pin etc. have been made during the course of revisions and are in vogue in Electric Locomotive.
- 2.2 The Instructions were also simultaneously issued by Electrical directorate on the subject matter as per the following details-
- (i) The MS No. WAG 7/5 issued dt. 21-1-98 in which greasing was recommended as per the MP Dte.'s recommendation and in line with WAG 6C loco.
 - (ii) MS No. WAG 7/8 issued on dt. 5-4-98. Shape of the head of the cotter was changed from rectangular to circular and length was increased to 140 mm and provision of cadmium plating was made.
 - (iii) MS No. 0307/2001 dt. 26-9-01 was issued along with the drawings No. SKEL-4601, 4602 & 4503. In this modification, the width of the cotter slot was increased to 10 mm from the existing 07 mm and the corresponding size of cotter was changed as 8 x 22 x 140 mm. This arrangement was different from the MP Dte.'s drawing No. SKVL-139, in which the slot width is 7 mm.
 - (iv) RDSO MS no. 331 Rev '0' of Nov'04 was issued for WAG7 and WCAM3 locomotives in which the pins and bushes and their fitment arrangement were recommended as per SKVL-139 Alt. 5 i.e. common for electric as well as diesel locomotive. The fitment of the pin is to be made as head in front and cotter in rear for easy greasing.
 - (v) RDSO vide letter no. EL/3.2.13/6 dt 3-1-08 have advised Railways for use of polyamide/nylatron bushes as per RDSO's specification No. 0056 of Jan'2008.

2.3 Existing Arrangement:

In view of the above instructions, different Railways or even different sheds under same zonal Railway have been following the different possible



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combinations of pins & cotter w.r.t. their design as well as fitment. The mixed design / arrangement in vogue are as follows:-

- a) The single and double cotter design pins.
- b) 6 mm and 8 mm thick cotter. Some of the Railways are even continuing with bulb type cotteners in lieu of flat cotter.
- c) The pins having cotter slot size of 7x25 mm as well as 10x28 mm.
- d) The greasing hole arrangement either from head or from tail.
- e) Fitment of head from front as well as from rear.
- f) The splitting practice of cotter of 8 mm thick either from thickness side or from width side.
- g) The poor quality cotter with respect to uneven cut and surface finish.
- h) No check on the quality of material of cotter.

3.0 Object:

3.1 With the introduction of WAG7 locomotives, the problems experienced by Railways were the fast wear and breakages of pins. The cases of breakages of compensating/equalizer beam have also occurred. Therefore, all the earlier RDSO's modifications, either by MP or Electrical Directorates were more focused for the above problems. Of late, the breakages of cotter pins either one leg or completely coming out (missing) from the slot are reported. Due to different design of pins and cotteners and fitment practice in vogue, the proper maintenance of the suspension arrangement is neither uniform nor being implemented by the Railways. The major issues of concern are as follows:

- Regular greasing during every IC.
- Use of poor quality cotter.
- Use of proper size washers.
- Use of 6x20 mm cotter pin in the higher size (10x25 mm) slot.
- Improper bending of cotter pins.
- Poor attention given to the condition of cotter during inspection schedules including trip inspection.
- Timely replacement of partially worn out cotteners.
- Use of proper design cotteners.

3.2 Considering the above, the existing drawing of MP Dte/RDSO No. SKVL-139 is revised as SKVL-703 (Alt '0') dated June 2010 for WAG-7 electric locomotives. The drawings & specification of cotter, adjusting steel washers, splitting of cotter after fitment is included in the same drawing. This drawing should be used for procurement of pins, cotteners, steel washers & bushes. The earlier issued all the drawings, instructions should be treated as superseded. Besides, there are other maintenance requirements for reliable and safe working of the suspension arrangement. Railways should implement the modified instructions as given below:-

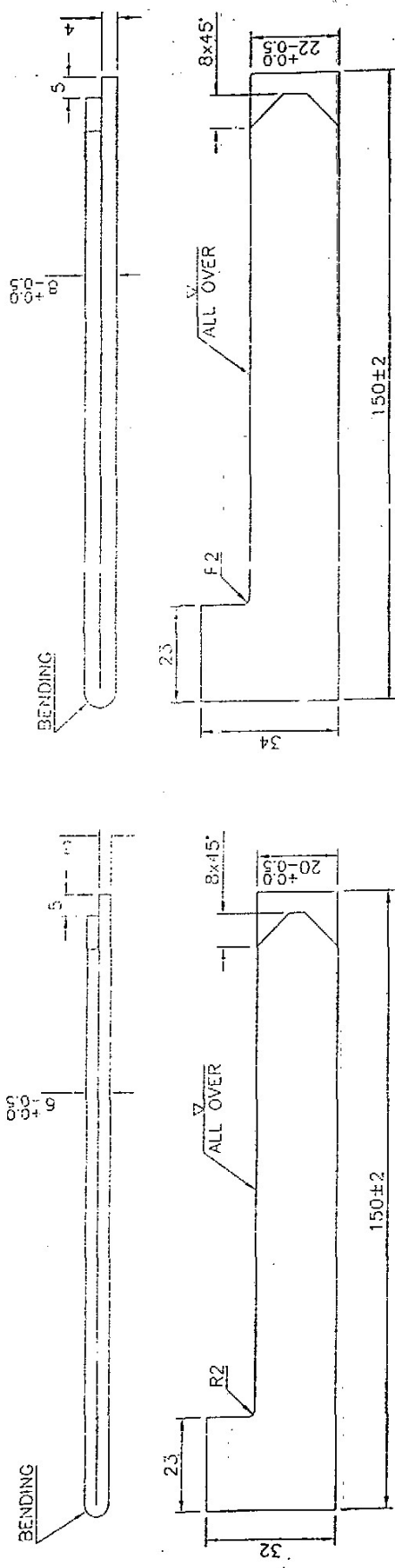
4.0 Modified instructions

4.1 All running staff including loco pilots/co-pilots should be counseled and directed for checking of the, (a) deficiencies of the cotter pins, (b) condition of

- 4.12 The use of steel spacer/washer of required sizes should be used as shown in the drawing. If required the step size washer of 1/2/3mm should be used for tight fitment of cotter.
- 4.13 The fitment arrangement of pins will be such that the cotter end (tail end) will be in front and head will be in rear to facilitate easy inspection of cotters. However, the axle box pin (longer size pin) shall be fitted with head in front for easy changing of the pin.
- 4.14 The provision of the polyamide bushes will be done by CLW & BHEL during manufacturing of new locomotives and during POH and IOH of locomotives in sheds/workshops. The polyamide bush should only be fitted during POH/IOH if the condition of the hole of compensating beam, equalizer beam and link is perfect. But, even with polyamide bush the greasing should continue to be done during every IC till 100 % provision of polyamide bush is done in WAG-7 locomotives.
- 5.0 **Application to:** All WAG7 Electric Locomotives.
- 6.0 **Agency of Implementation:** CLW/CRJ, BHEL/JHS all Electric Loco sheds POH workshop, Trip sheds and Loco examination points.
- 7.0 **Periodicity of Implementation:** During every Trip inspection minor scheduled inspections (IA, IB & IC) and AOH/IOH/POH

(M.K.Gupta)
for Director General/Elect.

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NOTE:-

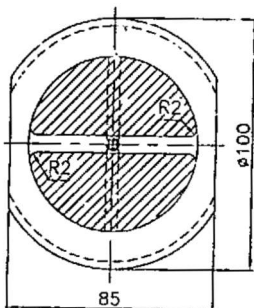
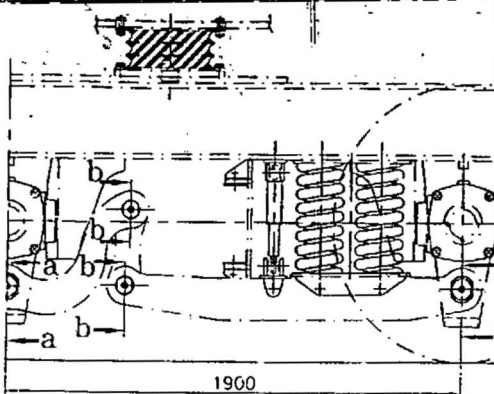
1. COTTER SHOULD BE MANUFACTURED BY BENDING OF 3/4 mm PLATE/STRIP TO IS:2062 Gr. E250 (Fe410w).
2. EACH COTTER SHALL BE MARKED BY PUNCHING CONTAINING BATCH NO., DATE OF MANUFACTURING AND MANUFACTURER'S NAME.
3. BENT TEST ON SELECTED SAMPLES SHOULD BE CARRIED OUT AS FOLLOWS:
IN COLD CONDITION, THE WINGS OF COTTER SHOULD BE OPENED UP FOR HALF OF THE COTTER LENGTH AND THE WINGS THUS OPENED SHALL BE CAPABLE OF BEING BENT BACKWARDS WITHOUT SHOWING ANY SIGN OF FAILURE THROUGH AN ANGLE OF 180° UNTILL THE ENDS OF WINGS TOUCH THE BODY OF THE COTTER, AND THE INTERNAL RADIUS OF THE BENDS SHOULD NOT BE MORE THAN 3/4 mm.
4. THE COTTER SHOULD NOT BE REUSED ON LOCOMOTIVES.

REF:	SCALE:	APPROVED BY:	FIRST ISSUED
APPLICABLE FOR	FLAT BENDED COTTER	(FOR DO)	JUNE 2010
WAG7 LOGO			SUPERSEDES
RDSO ELECT. DTE.	SKEL-4777	ALT-6	SUPERSEDED BY

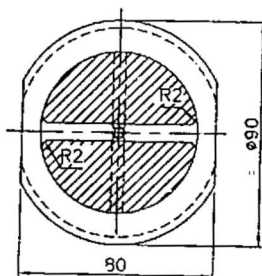
ALL DIMENSIONS ARE IN mm.

147-10
R11/10
NO.

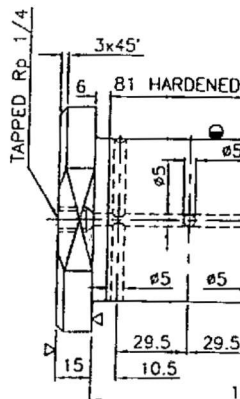
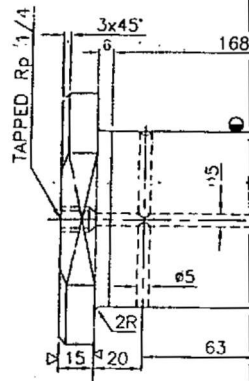
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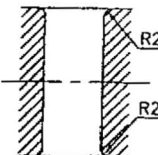
SECTION 'c-c'



SECTION 'e-e'



SECTION 'd-d'



TE:-

MATERIAL:

FOR PIN:

STEEL TO IS:1875 CLASS-IV. INDUCTION HEATED AND QUENCHED TO OBTAIN A UNIFORM SURFACE HARDNESS OF ROCKWELL "C" 58 (MINIMUM). AFTER GRINDING THE EFFECTIVE CASE DEPTH MEASURED PERPENDICULARLY FROM FINISHED SURFACE TO POINT OF HRC 50 SHALL BE:

DIAMETER

CASE DEPTH

	MINIMUM	MAXIMUM
LESS THAN 25.4 mm	0.1 x DIAMETER	0.15 x DIAMETER
25.4 mm OR GREATER	2.54 mm	3.8 mm

THE EXTREMITY OF PIN BODY END (PLAIN OR SHOULDERED PINS) SHOULD NOT HAVE ANY DISCONTINUITY. NO DISCONTINUITY ALLOWED WITHIN 3 mm (PREFERABLY WITHIN 6 mm) OF TRANSVERSE HOLE OR GROOVE OF PINS.

FOR METALLIC BUSH:

STEEL TO IS:1875 CLASS-I. THE BUSHING SHALL BE CARBURRISED QUENCHED AND TEMPERED AT 177°C. THE SURFACE HARDNESS AFTER GRINDING SHALL BE ROCKWELL "C" 58 (MINIMUM). THE EFFECTIVE CASE DEPTH AFTER GRINDING SHALL BE:-

NOMINAL WALL THICKNESS

EFFECTIVE CASE DEPTH

	LESS THAN	1.02 mm
3.175 mm TO THICKNESS	0.76 mm	1.02 mm
4.76 mm AND ABOVE	1.02 mm	1.27 mm

FOR NON-METALLIC BUSH:

SELF LUBRICATED, WEAR RESISTANT, WITH FOLLOWING PROPERTIES OR NYLATRON:

Sl.	PROPERTY	TEST METHOD	UNITS	PERMISSIBLE LIMITS
1.	Wear Rate	ASTM G 99	$\mu m/m$	12 (Maximum)
2.	Compression: Set at $80^{\circ} \pm 1^{\circ}C$ for 24 (-0/-2) hours	ASTM D 395	%	45 (Maximum)
3.	Izod Impact Strength (Notch)	ASTM D 256	Joules/m	25 (Minimum)
4.	Specific Gravity	ASTM D 792	-	1.1 (Minimum)
5.	Hardness	ASTM D 2240	Shore D	60 (Minimum)
6.	Melting Point	ASTM D 789	$^{\circ}C$	200 (Minimum)
7.	Water Absorption at $23^{\circ}C$ (temperature after 24 hrs immersion)	ASTM D 570	%	0.5 (Maximum)

THE MONOGRAM/NAME OF MANUFACTURER/MONTH OF MANUFACTURING SHOULD BE LEGIBLY EMBOSSED/ENGRAVED/MARKED ON ALL PIECES AT AN APPROPRIATE AND SAFE LOCATION.

COTTER SHOULD BE MANUFACTURED BY BENDING OF PLATE TO IS:2062 Gr. E250 (Fe410W)

THE COTTER SHOULD NOT BE REUSED ON LOCOMOTIVES.

BENT TEST ON SELECTED SAMPLES SHOULD BE CARRIED OUT AS FOLLOWS:

IN COLD CONDITION, THE WINGS OF COTTER SHOULD BE OPENED UP FOR HALF OF THE COTTER LENGTH AND THE WINGS THUS OPENED SHALL BE CAPABLE OF BEING BENT BACKWARDS WITHOUT SHOWING ANY SIGN OF FAILURE THROUGH AN ANGLE OF 150° UNTILL THE ENDS OF WINGS TOUCH THE BODY OF THE COTTER, AND THE INTERNAL RADIUS OF THE BENDS SHOULD NOT BE MORE THAN 5 mm. IF SLACK APPEARS BETWEEN WASHER AND COTTER, STEP SIZE WASHERS (ITEM 9) OF 1/2/3 mm THICKNESS MAY BE USED.

NIPPLE	28		IS:4009
HARDENED COTTER	28		SEE NOTE 3
PUNCHED WASHER $\phi 71/\phi 66$	-		
WASHER $\phi 66$	16		STEEL
WASHER $\phi 71$	12		
	24		ITEM 2 OF SK.DL-4191
	16		
	32		
	12		SEE NOTE 1
	16		
PIN	12		
DESCRIPTION	NO./ LOCO	WT.(Kg) EACH	MATL. SPEC./ REF. DRG. NO.

IN ARRANGEMENT

REF:NO. ELEC. DTE'S NOTE NO. EL/32.13/6 DATED 15/07/10

FIRST ISSUED

RG. SK.VI.-703

SUPERSEDES

SUPERSEDED BY

BY: 1. 0

~	50	
▽	25	
▽▽	6.3	
▽▽▽	0.8	*SURFACE ROUGHNESS TO IS:3073
▽▽▽▽	0.1	WELDING SYMBOLS TO IS:813
SYMBOL	Raum (Max.)	TOLERANCES ON UNTOLERANCED DIMENSIONS TO IS:2102(MEDIUM)