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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

EL/3.2.85

Date: 04.04.2014

Chief Electrical Engineer,  
Central Railway, Mumbai CST 400001  
East Central Railway, Hajipur, Bihar-844 101  
Northern Railway, Baroda House, New Delhi 110 001  
South Central Railway, Rail Neelayam, Secunderabad 500 371  
West Central Railway, Jabalpur (MP) 482 001  
South East Central Railway, Bilaspur-495004 (Chhatisgarh).  
Chittaranjan Locomotives Works, Chittaranjan

Sub: Issue of Altered Drawings No. SKEL-4893 Alt '1' for Modified Single Duct  
Leather Bellows for WAG9/WAP7 Locos pertaining to Modification Sheet No.  
RDSO/2009/ELRS/MS/0373 (Rev. '1') amendment '2' dt.15.04.2013.

Ref: (i) RDSO's letter of even no. dated 15.04.2013

(ii) M/s Dharam Veer & Sons's letter no. DVS/RDSO/EL/SD/2014/001 dt.  
27.03.2014

(iii) M/s A S Leather's letter no. nil dt. 28.03.2014

Vide letter quoted under ref. (ii) & (iii), firms reported problems in manufacturing of the subject item without manufacturing tolerances in some of the dimensions in existing drawings no. SKEL-4893 Alt '0'. RDSO studied the matter and necessary tolerances have been added. Revised drawing No. SKEL-4893 Alt '1' has been issued to overcome difficulties of manufacturing and inspection and the same is enclosed herewith along with amendment-3 of Modification Sheet No. RDSO/2009/ELRS/MS/0373 & 0374 (Rev. '1') amendment '2'.

  
(GANESH)  
for Director General/Electrical

Encls: as above

Copy to :-

1. Secretary(Electric Traction), Railway Board, Rail Bhawan, New Delhi- 110 001
2. a) M/s R.P. Machine Tools, Ghaziabad.  
b) M/s A.S. Leather Works, Kanpur.  
c) M/s Dharamveer & Sons, NOIDA.  
d) M/s Bombay Leather Industries, Mumbai.  
e) M/s Alumini Industries Pvt. Ltd. Kolkata

  
(GANESH)  
for Director General/Electrical

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Government of India - Ministry of Railways  
**Research, Designs & Standards  
Organization, Lucknow – 226011**

No. EL/3.2.85

Amendment-3

Date: 04.04.2014

**Modification Sheet No. RDSO/2009/ELRS/MS/0373 ( Rev.'1') amendment-2 dated  
15.04.2013**

**Title:**

Modification of Bellows and its Mounting arrangement of existing Traction Motors type 6FRA-6068 used in WAG9/WAP7 class of Locomotives (retro fitment).

**1. Object :**

- 1.1. TM bellow bottom plate(spacer plate) is fixed with stator end shield with 8 nos. of 10 mm counter sunk allen bolts. This plate has same nos. of threaded holes through which bellow is tightened with bolts. It is observed that bolts of bellow plate break in threaded hole due to vibration/ jerks and it is difficult to remove the broken bolts. Moreover, the spacer plate also gets displaced due to damaged threads in stator end shield.
- 1.2. ECR has reported rubber bellows are not giving adequate life as these are getting damaged at its bottom near the fixation point as a result of frequent connection and disconnection. It is not possible to attend even a minor repair on these bellows unlike leather bellows.
- 1.3. Apart from this, broken bolts used to fall into traction motor through the duct and causing failure of traction motor also.
- 1.4. The problem with mounting arrangement of bellows of traction motors of WAG9 locomotives was discussed during the visit of Additional Member(Electrical), Railway Board to ELS/LGD on 29.06.08 & 03.07.08.
- 1.5. Existing bellows are two per traction motor with one divider. Member (Electrical) ,Railway Board , during his visit to RDSO on 05.04.2007 ,Lucknow emphasized the need of development of Single Duct Bellow for traction motors of WAG9 locomotives in place of existing two ducts arrangement to ensure proper cooling. In compliance to ML's instruction RDSO has designed and developed single duct leather bellow for traction motors, which have been provided in WAG9 loco of GMO base.
- 1.6. RDSO has modified bellows along with its mounting arrangement for WAG9/WAP7 locomotives to overcome above problems .
- 1.7. The proposed modifications is for existing traction motors.
- 1.8. Its salient features are listed below:
  - 1.8.1. Flanges of top and bottom spacer plates of bellow have been made wide enough (in line with Hitachi TMs) while keeping the internal dimensions unaltered. Bellows top and bottom plates have also been suitably modified. With this arrangement, these bellow plates can be tightened together with nut and bolts outer while spacer plates can be welded on end shields.
  - 1.8.2. For existing traction motors, modified spacer plate can be welded on end shield .
  - 1.8.3. The material of proposed bellows is rubber which is cheaper than leather and proven in service on all types of TMs in Electric Locomotives.
  - 1.8.4. In order to improve the cooling of traction motors and avoid problems related to existing design, it has been decided to have single duct leather bellow .

**2. Work to be carried out :**

- 2.1. Remove the existing spacer plate of traction motor and tighten the modified plate flange traction motor inlet as per RDSO's drg no. SKEL-4892 Alt.'0'. The modified plate is having 8 nos counter shunk holes for fixing base plate of end shield..

- 2.2. Use single duct leather bellow as per RDSO's drg no. SKEL-4893 Alt.'1' along with modified bellow bottom plate as per RDSO's drg. No. SKEL-4891 Alt.'0' to secure the bellow at traction motor end with the help of 12 mm size nut and M12X30 grade 8.8 bolts.
- 2.3. Provide modified top plate with flange as per RDSO drg. No. SKEL-4894 Alt. '0' to secure the bellow with locomotives with nuts(size 12 mm).

**3. Application :**

All existing three phase traction motors type 6FRA-6068 used in WAG9/WAP7 Locomotives

**4. Material Required:**

- 4.1. **Single duct leather bellow as per RDSO's drg no. SKEL-4893 Alt. '1'**
- 4.2. **Modified Plate-Flange-Traction Motor Inlet as per RDSO's drg no. SKEL-4892 alt. '0'**
- 4.3. **Modified Bellow bottom plate as per RDSO's drg no. SKEL-4891 Alt. '0'**
- 4.4. **Modified Bellow top plate as per RDSO's drg. No. SKEL-4894 Alt. '0'**

**5. Material rendered surplus :**

Rubber bellows , bottom spacer plate and top plate and top bellow plate

**6. Modification Drawing No. :**

- 6.1. SKEL-4891 Alt '0'
- 6.2. SKEL-4892 Alt '0'
- 6.3. SKEL-4893 Alt '1'
- 6.4. SKEL-4894 Alt '0'

**7. Periodicity of Implementation :**

All new traction motors type 6FRA-6068.

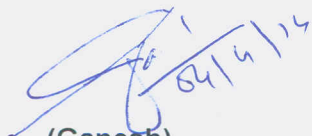
**8. Agency of Implementation :**

All traction motor manufacturer

**9. Distribution:**

As per enclosed list.

**DA: as above**

  
(Ganesh)  
for Director General (Elec.)



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लखनऊ - 226011  
Government of India - Ministry of Railways  
Research, Designs & Standards  
Organization, Lucknow - 226011

No. EL/3.2.85

Amendment-3

Date: 04.04.2014

**Modification Sheet No. RDSO/2009/ELRS/MS/0374 ( Rev. '1') amendment-2 dated  
15.04.2013**

**Title:**

Modification of Bellows and its Mounting arrangement on New Traction Motors type 6FRA-6068 used in WAG9/WAP7 class of Locomotives (new manufacturing).

**1. Object :**

- 1.1. TM bellow bottom plate(spacer plate) is fixed with stator end shield with 8 nos. of 10 mm counter sunk allen bolts. This plate has same nos. of threaded holes through which bellow is tightened with bolts. It is observed that bolts of bellow plate break in threaded hole due to vibration/ jerks and it is difficult to remove the broken bolts. Moreover, the spacer plate also gets displaced due to damaged threads in stator end shield.
- 1.2. ECR has reported rubber bellows are not giving adequate life as these are getting damaged at its bottom near the fixation point as a result of frequent connection and disconnection. It is not possible to attend even a minor repair on these bellows unlike leather bellows.
- 1.3. Apart from this, broken bolts used to fall into traction motor through the duct and causing failure of traction motor also.
- 1.4. The problem with mounting arrangement of bellows of traction motors of WAG9 locomotives was discussed during the visit of Additional Member(Electrical), Railway Board to ELS/LGD on 29.06.08 & 03.07.08.
- 1.5. Existing bellows are two per traction motor with one divider. Member (Electrical) ,Railway Board , during his visit to RDSO on 05.04.2007 ,Lucknow emphasized the need of development of Single Duct Bellow for traction motors of WAG9 locomotives in place of existing two ducts arrangement to ensure proper cooling. In compliance to ML's instruction RDSO has designed and developed single duct leather bellow for traction motors, which have been provided in WAG9 loco of GMO base.
- 1.6. RDSO has modified bellows along with its mounting arrangement for WAG9/WAP7 locomotives to overcome above problems .
- 1.7. The proposed modifications is for existing traction motors.
- 1.8. Its salient features are listed below:
  - 1.8.1. Flanges of top and bottom spacer plates of bellow have been made wide enough (in line with Hitachi TMs) while keeping the internal dimensions unaltered. Bellows top and bottom plates have also been suitably modified. With this arrangement, these bellow plates can be tightened together with nut and bolts outer while spacer plates can be welded on end shields.
  - 1.8.2. For existing traction motors, modified spacer plate can be welded on end shield .
  - 1.8.3. The material of proposed bellows is rubber which is cheaper than leather and proven in service on all types of TMs in Electric Locomotives.
  - 1.8.4. In order to improve the cooling of traction motors and avoid problems related to existing design, it has been decided to have single duct leather bellow .

**2. Work to be carried out :**

- 2.1. Get modified NDE traction motor end frame manufactured as per RDSO's drg. No. SKEL-4760. Twelve nos 12 mm dia holes provided for securing bellow are tapped holes for 12 mm hex head bolts.

- 2.2. Use single duct leather bellow as per RDSO's drg no. SKEL-4893 Alt.'1' along with modified bellow bottom plate as per RDSO's drg. No. SKEL-4891 Alt.'0' to secure the bellow at traction motor end with the help of 14 mm size nuts .
- 2.3. Provide modified top plate with flange as per RDSO drg. No. SKEL-4894 Alt. '0' to secure the bellow with locomotives with nuts(size 12 mm)

**3. Application :**

All existing three phase traction motors type 6FRA-6068 used in WAG9/WAP7 Locomotives

**4. Material Required:**

- 4.1. **Single duct leather bellow** as per RDSO's drg no. SKEL-4893 Alt. '1'
- 4.2. **Modified Plate-Flange-Traction Motor Inlet** as per RDSO's drg no. SKEL-4892 alt. '0'
- 4.3. **Modified Bellow bottom plate** as per RDSO's drg no. SKEL-4891 Alt. '0'
- 4.4. **Modified Bellow top plate** as per RDSO's drg. No. SKEL-4894 Alt. '0'

**5. Material rendered surplus :**

Rubber bellows , bottom spacer plate and top plate and top bellow plate

**6. Modification Drawing No. :**

- 6.1. SKEL-4891 Alt '0'
- 6.2. SKEL-4892 Alt '0'
- 6.3. SKEL-4893 Alt '1'
- 6.4. SKEL-4894 Alt '0'

**7. Periodicity of Implementation :**

When ever Traction motors are taken out for IOH, AOH & POH in existing motors.

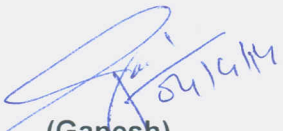
**8. Agency of Implementation :**

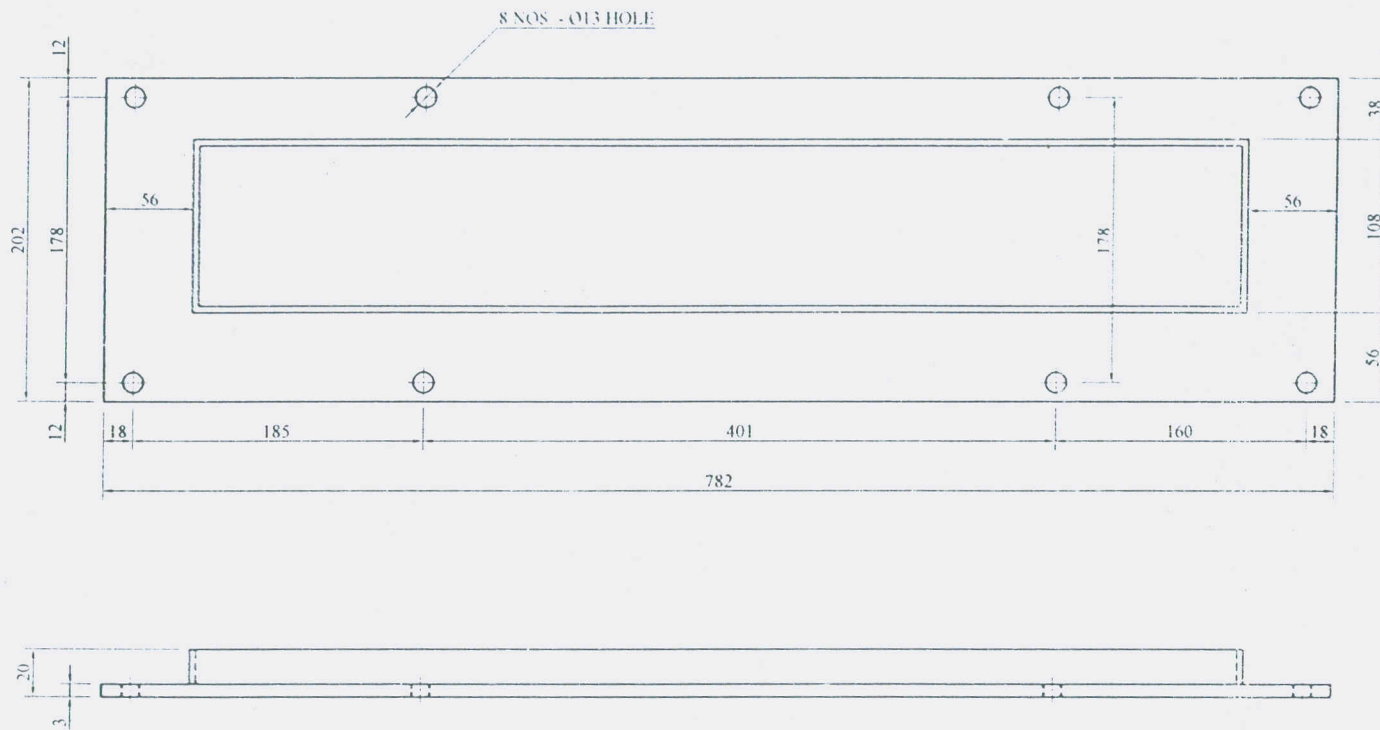
All Sheds & workshops

**9. Distribution:**

As per enclosed list.

**DA: as above**

  
(Ganesh)  
for Director General (Elec.)



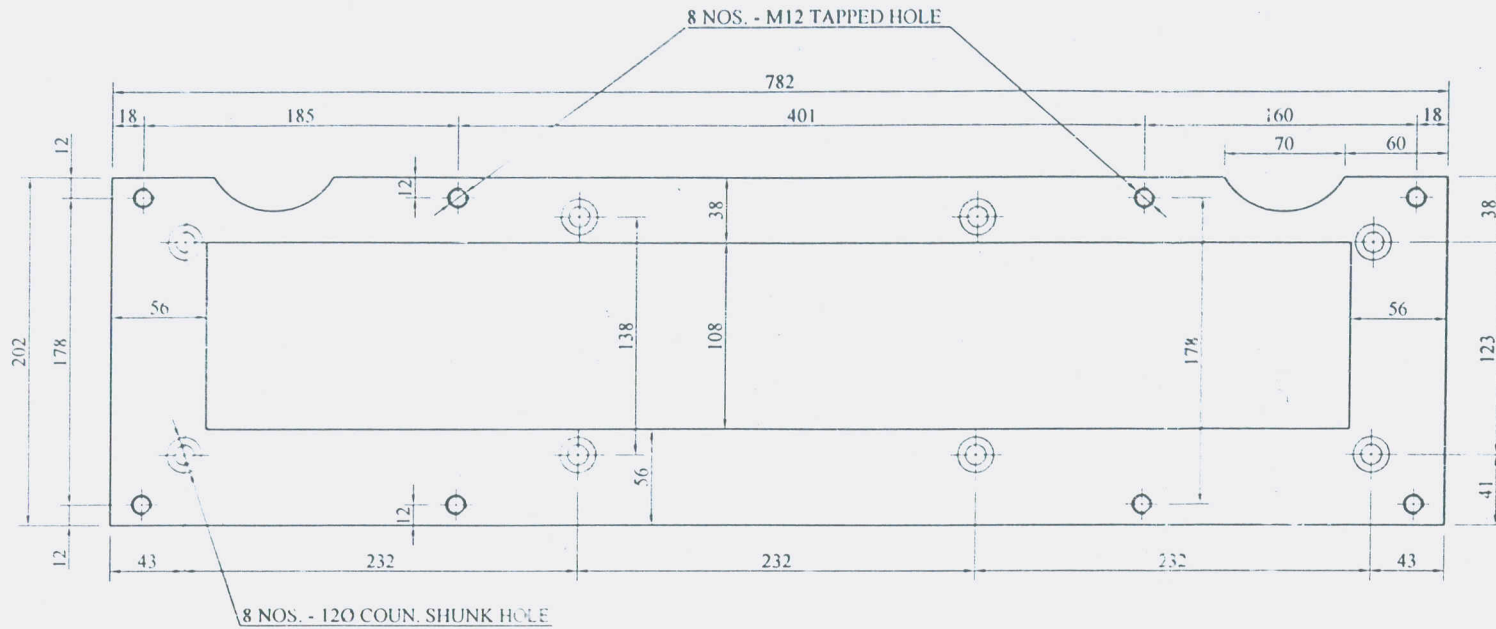
- NOTE: 1. All dimensions are in mm.  
 2. Collars on both the plates are welded on the base plate.  
 3. One advance sample to be got approved before bulk manufacturing.

12.04.13  
 M. AZEEM  
 [Signature]

STATUS	ALT	REF NO	DESCRIPTION	APPD BY	DATE

REF NO	PART NO	DESCRIPTION	DETAIL DRG NO	NO / LOCO	MATL	SPEC
				SCALE - N T S	APPD BY	(FOR DG)
				FIRST ISSUED		
				SUPERSEDES SKEL 4757		
				RDSO ELECT. DTE.		
				SKEL-4891	SUPERSEDED BY	



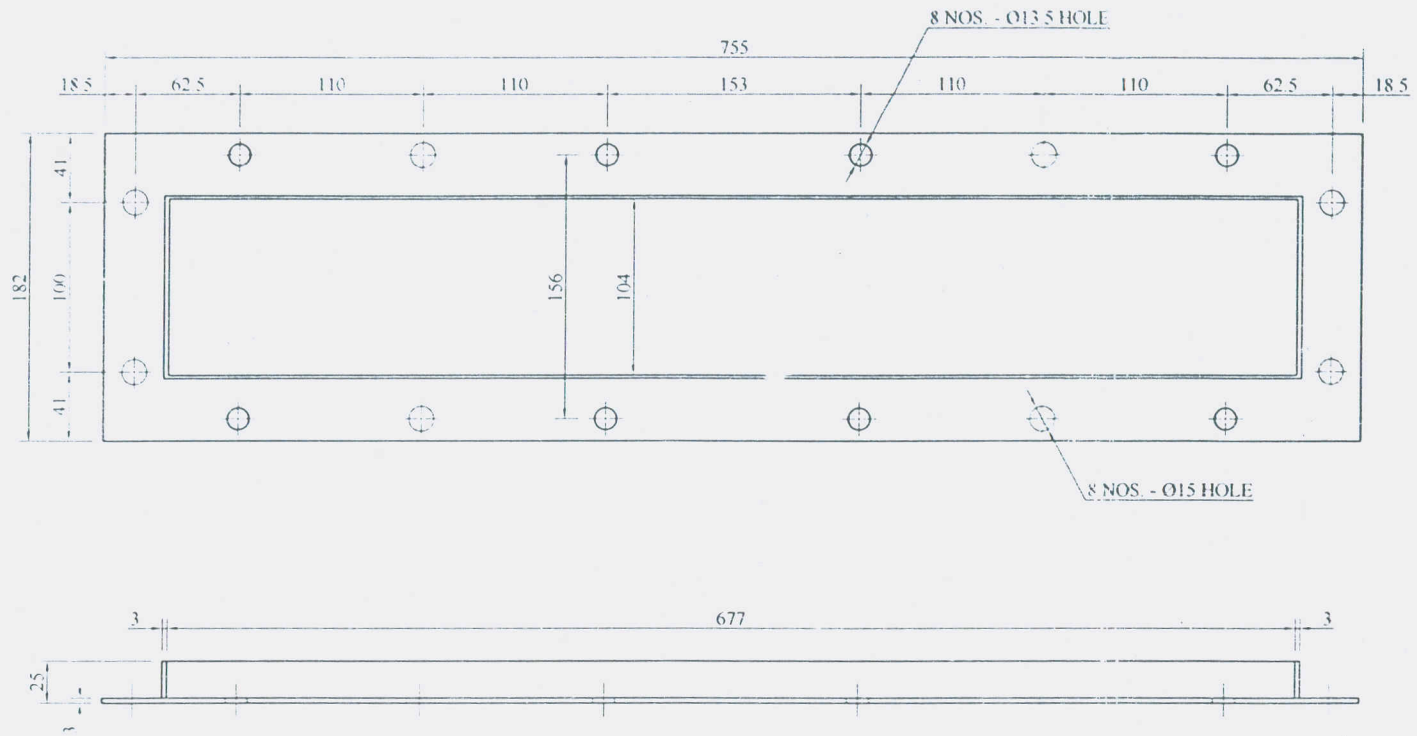


- NOTE: 1. All dimensions are in mm.  
 2. Collars on both the plates are welded on the base plate.  
 3. One advance sample to be got approved before bulk manufacturing.

1				6/LOCO	MS PLATE	IS 2062
REF NO	PART NO	DESCRIPTION	DETAIL DRG NO	NO / LOCO	MATI	SPEC
			SCALE - N T S	APPD BY	(FOR DC)	
MODIFIED PLATE - FLANGE TRACTION MOTOR INLET FOR WAG9/WAP7 LOCOMOTIVES					FIRST ISSUED	
					SUPERSEDES SKEL- 4758	
<b>RDSO ELECT. DTE.</b>				SKEL-4892	SUPERSEDED BY	

STATUS	ALT	REF. NO.	DESCRIPTION	APPD BY	DATE

DATE	



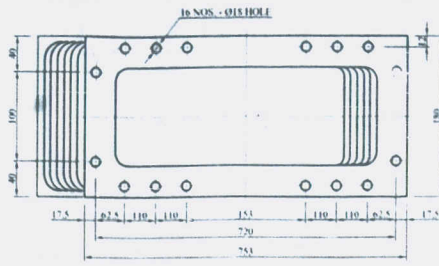
- NOTE: 1. All dimensions are in mm.  
 2. Collars on both the plates are welded on the base plate.  
 3. One advance sample to be got approved before bulk manufacturing.

DAD	
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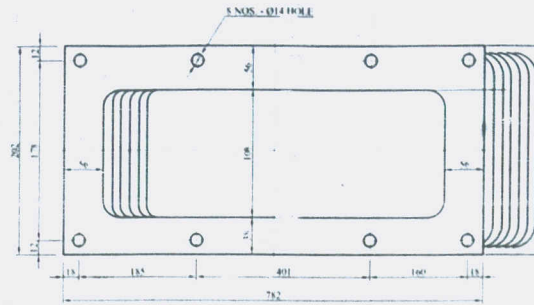
STATUS	ALT	REF NO.	DESCRIPTION	APPD BY	DATE

	1			6 LOCO	MS PLATE	IS 2062
REF NO	PART NO	DESCRIPTION	DETAIL DRG NO	NO / LOCO	MATL	SPEC
				SCALE - N T S	APPD BY	(FOR DG)
MODIFIED BELLOW TOP PLATE FOR WAG9/WAP7 LOCOS					FIRST ISSUED	
					SUPERSEDES SKEL 4763	
<b>RDSO ELECT. DTE.</b>				SKEL-4894	SUPERSEDED BY	

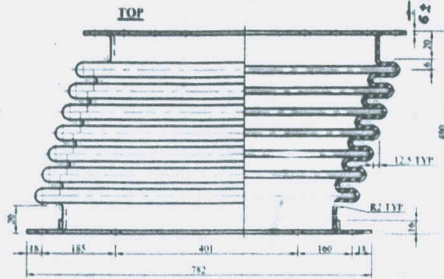




DETAILS TOP SIDE OF LEATHER BELLOW TYPE - I



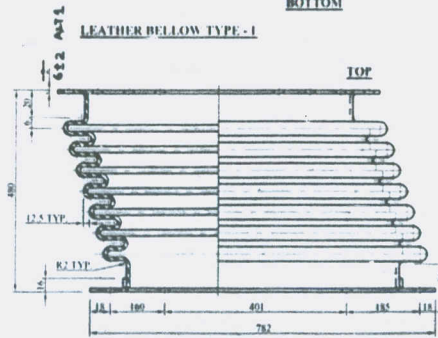
DETAILS BOTTOM SIDE OF LEATHER BELLOW TYPE - I



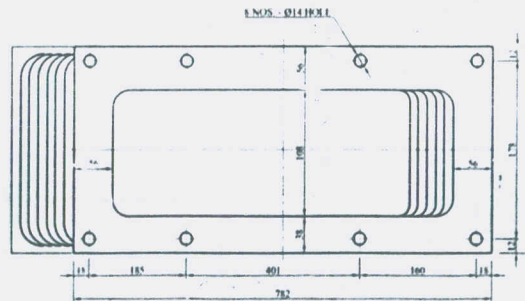
LEATHER BELLOW TYPE - I



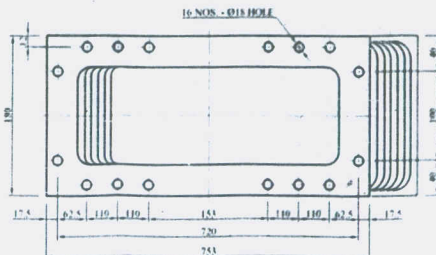
DETAILS OF G.I. WIRE RING



LEATHER BELLOW TYPE - II



DETAILS BOTTOM SIDE OF LEATHER BELLOW TYPE - II



DETAILS TOP SIDE OF LEATHER BELLOW TYPE - II

**Note :-**

1. All dimensions are in mm. WITH TOLERANCE OF  $\pm 3$  mm.
2. Material :- TM Bellow Plate & Bellow Frame (Top & Bottom) Steel, IS : 2062.
3. **LEATHER BELLOW**
  - a). Support pieces will be glued and stitched all around the Bellow plates.
  - b). SWG galvanised iron wire for reinforcement.
  - c). Double stitch all around (except on iron wire reinforcement) with 2-3 per cm. with 10 Kg. (UTS strength) Nylon thread length of each will not exceed 10 cm.
  - d). On iron wire reinforcement single stitch 2 - 3 stitches per cm. shall be provided.
  - e). Tolerance on thickness +/- 0.5 mm.
  - f). Rings are placed on out side fully reinforced with leather.
  - g). Top of the flange should be smooth at joints.
  - h). Fully stretched length of bellow will be 480 mm. +/- 20 mm.
  - i). Material fully chrome tanned buffalo hide leather as per IS:578-1985, III revision amend-1, Nov.-1992.
  - j). Manufacturer's name, year of manufacturing and IR emblem emboss at two places on bottom flange.
4. One advance sample of back tems to be get approved before bulk manufacturing.
5. Quantities of bellows Type - I : 2 nos. and Type - II : 4 nos.

DATE	12.04.13
BY	M. AZEEM
BY	<i>[Signature]</i>

STATUS	1.	dim 2 & note 1 modified & note 3 added	<i>[Signature]</i>	05.4.13
ALT.				
REF. NO.				
DESCRIPTION				
APPD. BY				
DATE				

REF. NO.	PART NO.	DESCRIPTION	DETAIL DRG. NO.	NO./LOCO	MATL.	SPEC.
	02	8 SWG GI WIRE			MS	IS: 7867-1992 REV 1
	01	LEATHER BELLOW		6/LOCO	LEATHER	IS: 578-1985
			SCALE - N.T.S.	APPD. BY <i>[Signature]</i>	(FOR DG)	
MODIFIED SINGLE DUCT LEATHER BELLOWS FOR WAG9/WAP7 LOCOS					FIRST ISSUED	
<b>RDSO ELECT. DTE.</b>					SUPERSEDES SKEL 4759	
SKEL-4893					SUPERSEDED BY	