BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014, INDIA

QUALITY ASSURANCE

CREEP TESTING (STRESS RUPTURE) REQUIREMENTS AS PER IBR

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RECORD OF REVISIONS

Rev. No.	DATE	Clause No.	Details of Revision
00	20/11/2017	---	Fresh issue
01	*03/09/2018*	*1.0*	*Scope modified to bring more clarity*
		2.0	*Cl. 2 modified to bring creep requirements for all suppliers, additional labs are listed and Table 2 modified inline with the changes proposed in the new IBR draft.*

1.0 SCOPE

a) Creep testing is required as per IBR for all alloy & stainless steels materials *which are to be used in furnace or in super heater zone of boilers* being erected in India.
Hence, for our current boiler design, creep testing is required for tubes & forged finned elbows only.

b) *If the creep properties are established either by the mill on the starting raw material or by supplier on the finished product, then creep test reports shall meet the requirements of Clause 2.*

c) *If the starting material is sourced from any mill which has not established creep properties, then creep testing shall be done as per Clause 2 on the product. If the Test results are meeting the requirements, then it can be treated as an approval of the creep values for the Mill which has supplied the starting material.*

2.0 CREEP TESTING REQUIREMENTS

Creep testing shall be done in line with the following:

For the starting raw material (Ingot, billet, bloom, etc.), supplier/s shall produce the Creep (stress rupture) test report for each material grade being supplied by them as per the Table 1 given below:

Table 1. Creep Stress rupture testing Requirements

Sl. No	Steel Type and Grade	Testing hours – min. (hrs.)	Testing Temperature (^{0}C)	Stress Value (MPa)	No. of tests & Specimen Size
1	Alloy Steels (AS) – Grade 11, 12 and Grade 22	1000	550	100	Two no. of tests with preferably M10 round sample
2	Alloy Steels (AS) – Grade 91, 92 and 23	1000	600	120	Two no. of tests with preferably M10 round sample
3	All Stainless Steels (SS) grades	1000	600	110	Two no. of tests with preferably M10 round sample

a) *For steels produced indigenously,* creep testing shall be carried out at National Metallurgical Laboratory, Jamshedpur, Corporate Research & Development Laboratory of Bharat Heavy Electricals Limited, Hyderabad, *Well Known Steel Makers or any other Material Testing Laboratory recognized by the Central Boilers Board.*

b) *For steels produced outside India, creep testing shall be carried out at Well Known Steel Makers, Nationally recognized / accredited testing laboratory in the country of manufacture. Alternatively, the testing can also be done in any other laboratory if the tests are witnessed by a Competent Person working with IBR Authorized Inspection Agencies.*

c) Creep testing shall be done as per ASTM E139 (latest) or BS EN ISO 204 (latest).
d) *Two Test specimens shall be prepared from the test bar.*
e) **Acceptance Criteria:** The samples tested shall not rupture and shall meet the *creep requirements at* 1,000 hours of testing at indicated temperatures & stress values as per Table 1.
f) Reporting: As per Table 2.

Table 2. Suggested/Recommended Format for Reporting the Creep Testing Data:

Sl No	Description	Details/Results
1	Report No. Date:	
2	Name and Address of the *Tube/ Forged Finned Elbow* Manufacturer	
3	Name and Address of the Raw Material Supplier	
4	Material Specification & Grade (Code Case, if applicable)	
5	Heat/Melt No, Sl No (if applicable)	
6	Heat treatment details (Type & Temperature)	
7	Name and Address of Testing Laboratory	
8	Testing method/ Standard (ASTM E139 or BS EN ISO 204) & Revision/Edition	
9	Test Sample Size	
10	No. of test samples	
11	Temperature at which test is conducted (^{0}C)	
12	Stress value observed (MPa)	
13	Test Start Date & Time	
14	Test End/Reporting Date & Time	
15	Test duration (hours of creep testing)	
16	Test witnessed by (Name of Inspector & Agency)	
17	Test Result (Accepted/Not Accepted)	