



中国船级社
CHINA CLASSIFICATION SOCIETY

编号/No.: SH21CS5007

铝合金角件试验报告
TEST REPORT OF ALUMINIUM ALLOY CORNER CASTING

委托方 Client	邵妮 (310108197507224021)		
制造厂名称 Manufacturer	山东诺维科轻量化装备有限公司		
制造厂地址 Address of manufacturer	山东龙口诸由观镇丛林工业园北路		
试验机构 Testing institute	昆山吉海实业有限公司		
产品名称 Product name	铝合金角件 Aluminium alloy corner	设计温度 Design temperature	-40~40 °C
顶角件自重 Tare mass of top corner	4 kg	底角件自重 Tare mass of bottom corner	4 kg
外部尺寸 Overall dimensions	178×162×138 mm	主体材料 Main material	7075-T651 (EN 485)
试验依据 Testing Regulations	1) 委托方提交的设计文件/Design documents submitted by the client 2) 参考 ISO1161-2016 《系列 1 集装箱—角件技术要求》/ Reference ISO 1161-2016 Series 1 freight containers — Corner and intermediate fittings — Specifications		

下面署名的验船师根据本社规范的要求，见证了上述铝合金角件的有关试验，试验项目见试验报告项目表。
According to the Rules of this Society, the undersigned surveyor did witness the testing of the above-mentioned aluminium alloy corner casting, the test items listed on the "Check list of test report".

签发日期/Date of issue: 2022 年 2 月 9 日/February 9, 2022

签发地点/Place of issue: 上海/Shanghai



验船师/Surveyor:

纪鹏飞

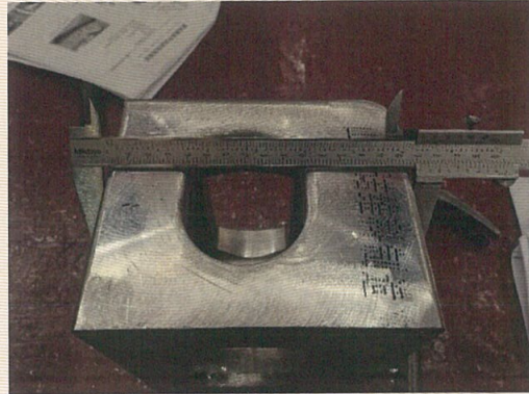
(Ji Pengfei)

外形尺寸检查

EXTERNAL DIMENSION CHECK



长度检查/ Length check



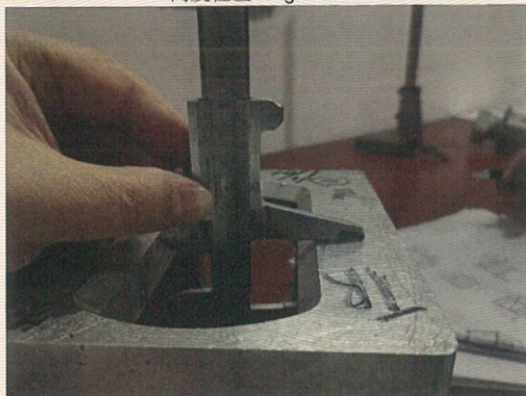
宽度检查/ Wide check



高度检查/ High check



外观检查/ Appearance check



壁厚检查/ Wall thickness check



壁厚检查/ Wall thickness check

检查结果/Result:

- 1、部件及试样编号/ Components and sample No. : 底角件/ bottom fitting B-6, 顶角件/ Top fitting T-7.
- 2、角件尺寸为 178.3×162.0×138.2mm (长×宽×高)。/ The size of corner is 79×50×20mm (L×W×H) .
- 3、外观良好。/ Appearance is good.

结论/Comments:

- 1、角件高度值比 ISO1161 标准值高 20mm, 但侧面孔位置不影响吊装使用。/ The height of the fitting is higher than the standard value of ISO1161 20mm, but the position of the side apertures don't affect usability.



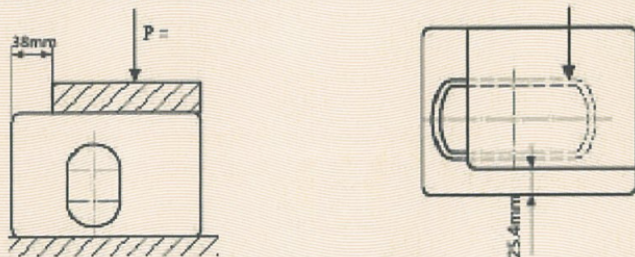
验船师/Surveyor: 纪鹏飞

(Ji Pengfei)

堆码试验 1

STACKING TEST 1

加载示意图/ Loading schematic figure



实际加载/ Actual loading

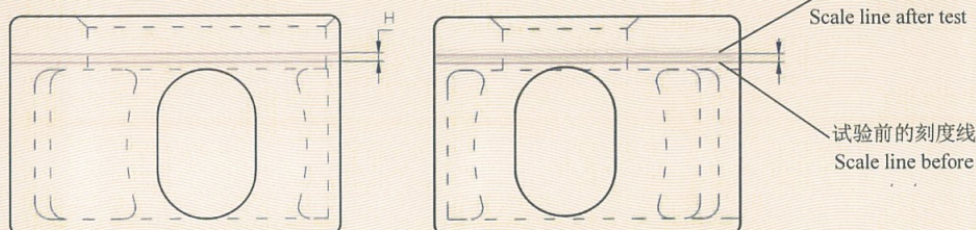


堆码试验/ Stacking test

试验条件/ Test condition:

- | | |
|---------------------------------------|---------------------------|
| 1) 部件及试样编号/ Components and sample No. | 顶角件/ Top fitting T-1, T-2 |
| 2) 试验载荷/Load (P): | 1037kN |
| 3) 保持时间/Duration : | 120s |
| 4) 试验依据/Test evidence : | ISO1161:2016 8.3.2 |

测量示意图/ Measurement schematic figure



检查结果/Result:

试样编号/ Sample No.	侧孔面变形/ Side wall deformation	端孔面变形/ End wall deformation
T-1	0.1mm	0
T-2	0.1mm	0

备注/Remark:

- 1、测量位置为顶角件底部以上 100mm，下刻度线为堆码试验前的划线，上刻度线为堆码试验后的划线，变形为两刻度线差值。
The measuring position is 100mm above the bottom of the top fitting, the lower scale line is marked before test, the upper scale line is marked after test, and the difference between the two scale lines is deviation.
- 2、因该底面与角件本体焊接后成型，底面实际有约 0.7mm 的变形，故实际测量结果可能包括因底面焊接变形产生的误差。
Because the bottom wall and the fitting is formed by welding, the actual deformation of the bottom plate is about 0.7mm, so the actual measurement results may include errors which caused by the welding deformation of the bottom plate.

结论/Comments:

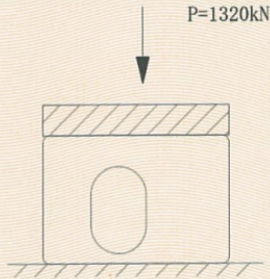
- 1、试验后，角件未出现影响使用的永久性变形和异状。/ Upon completion of the test, the fittings have neither permanent deformation which render it unsuitable for use nor abnormality which will render it unsuitable for use.



验船师/Surveyor: 纪鹏飞 (Ji Pengfei)

堆码试验 2 STACKING TEST 2

加载示意图/ Loading schematic figure



实际加载/ Actual loading

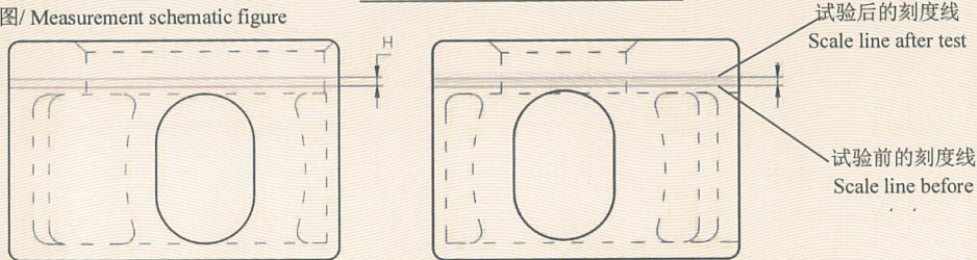


堆码试验/ Stacking test

试验条件/ Test condition:

- | | |
|---------------------------------------|------------------------------|
| 1) 部件及试样编号/ Components and sample No. | 底角件/ Bottom fitting B-1, B-2 |
| 2) 试验载荷/Load (P): | 1320kN |
| 3) 保持时间/Duration : | 120s |
| 4) 试验依据/Test evidence : | ISO1161:2016 8.3.4 |

测量示意图/ Measurement schematic figure



检查结果/Result:

试样编号/ Sample No.	侧孔面变形/ Side wall deformation	端孔面变形/ End wall deformation
B-1	1.0mm	0.3mm
B-2	0.6mm	0

备注/Remark:

- 1、测量位置为底角件底面以上 100mm，下刻度线为堆码试验前的划线，上刻度线为堆码试验后的划线，变形为两刻度线差值。
The measuring position is 100mm above the bottom of the bottom fitting, the lower scale line is marked before test, the upper scale line is marked after test, and the difference between the two scale lines is deviation.
- 2、因该底面与角件本体焊接后成型，底面实际有约 0.7mm 的变形，故实际测量结果可能包括因底面焊接变形产生的误差。
Because the bottom wall and the fitting is formed by welding, the actual deformation of the bottom plate is about 0.7mm, so the actual measurement results may include errors which caused by the welding deformation of the bottom plate.

结论/Comments:

- 1、试验后，角件未出现影响使用的永久性变形和异状。/ Upon completion of the test, the fittings have neither permanent deformation which render it unsuitable for use nor abnormality which will render it unsuitable for use.

验船师/Surveyor:

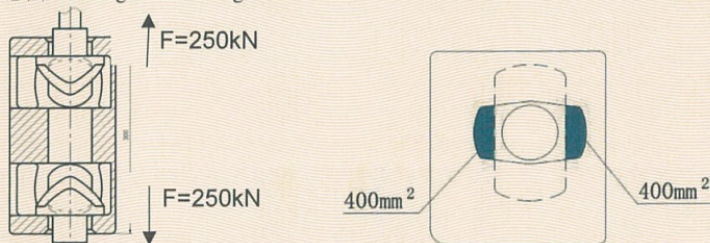
(Ji Pengfei)



转锁起吊试验

Twistlock lifting test

加载示意图/ Loading schematic figure



实际加载/ Actual loading



转锁起吊试验/ Twistlock lifting test

试验条件/ Test condition:

- | | |
|---------------------------------------|---|
| 1) 部件及试样编号/ Components and sample No. | 顶角件/ Top fitting T-3, 底角件/ Bottom fitting B-3 |
| 2) 试验载荷/Load (F): | 250kN |
| 3) 接触面积/ Contact area: | 400mm ² +400mm ² |
| 4) 保持时间/Duration : | 120s |
| 5) 试验依据/Test evidence : | ISO1161:2016 8.3.6 |

测量示意图/ Measurement schematic figure



检查结果/Result:

试样编号/ Sample No.	初始值/ Initial value	角件面变形/ Deformation of fitting face
T-3	0	≤0.1mm
B-3	0	≤0.1mm

备注/Remark:

- 1、试验后用板尺侧面测量角件面的变形。
The deformation of the fitting face is measured by the side of the ruler after test.

结论/Comments:

- 1、试验后，角件未出现影响使用的永久性变形和异状。/ Upon completion of the test, the fittings have neither permanent deformation which render it unsuitable for use nor abnormality which will render it unsuitable for use.

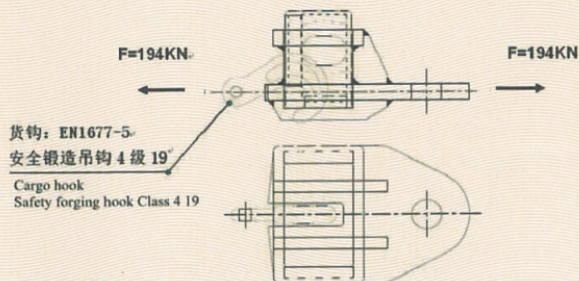
验船师/Surveyor:

(Ji Pengfei)

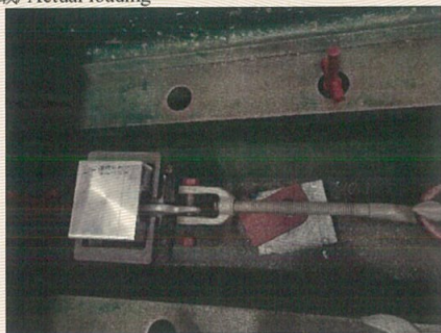
货钩起吊试验 1

Cargo hook lifting test 1

加载示意图/ Loading schematic figure



实际加载/ Actual loading

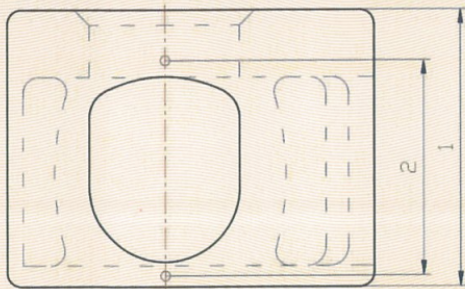


货钩起吊试验/ Cargo hook lifting test

试验条件/ Test condition:

1) 部件及试样编号/ Components and sample No.	顶角件/ Top fitting T-7
2) 试验载荷/Load (F):	194kN
3) 载荷与顶面夹角/ Angle between load and top wall	0°
4) 保持时间/Duration :	120s
5) 试验依据/Test evidence :	ISO1161:2016 8.3.7

测量示意图/ Measurement schematic figure



检查结果/Result:

测量位置/ Measuring position	初始值/ Initial value	加载后值/Value after load	变形值/ Deformation
1	137.9mm	138.2mm	0.3mm
2	93.2mm	93.9mm	0.7mm

备注/Remark:

1、测量位置为顶角件端孔长径方向的变化值。

The measuring position is deformation of the long diameter direction of the top fitting side aperture.

结论/Comments:

1、试验后，角件未出现影响使用的永久性变形和异状。/ Upon completion of the test, the fittings have neither permanent deformation which render it unsuitable for use nor abnormality which will render it unsuitable for use.

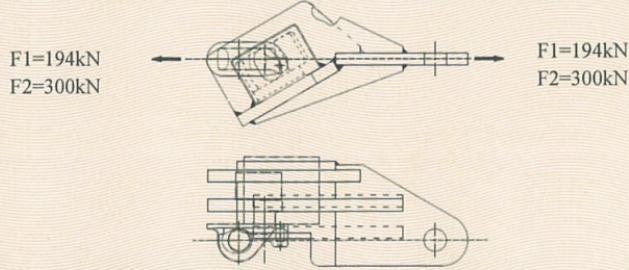
验船师/Surveyor: 

(Ji Pengfei)

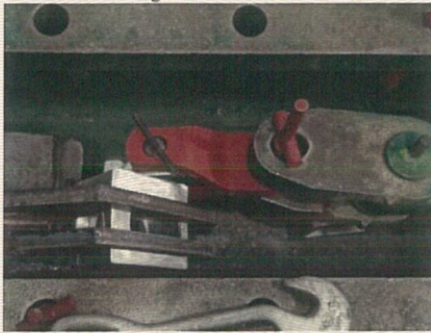
货钩起吊试验 2

Cargo hook lifting test 2

加载示意图/ Loading schematic figure



实际加载/ Actual loading

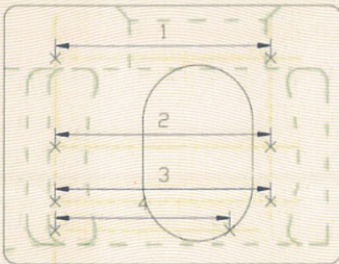


货钩起吊试验(30°) / Cargo hook lifting test

试验条件/ Test condition:

1) 部件及试样编号/ Components and sample No.	底角件/ Bottom fitting B-7
2) 第一次试验载荷/First load (F1):	194kN
3) 第二次试验载荷/Second load (F2):	300kN
4) 载荷与顶面夹角/ Angle between load and top wall	30°
5) 保持时间/Duration :	120s
6) 试验依据/Test evidence :	ISO1161:2016 8.3.8

测量示意图/ Measurement schematic figure



检查结果/Result:

测量位置/ Measuring position	初始值/ Initial value	F1 加载后值/ Value after load F1	F2 加载后值/ Value after load F2	变形值 / Deformation
1	111.3mm	111.3mm	111.8mm	0.5mm
2	111.2mm	111.5mm	111.9mm	0.7mm
3	112.2mm	112.5mm	112.8mm	0.6mm
4	103.0mm	103.2mm	103.5mm	0.5mm

备注/Remark:

1、测量位置为底角件试验前后标定位置的变化值。

The measuring position is deformation of the calibrated position before and after the test for the bottom fitting.

结论/Comments:

1、试验后, 角件未出现影响使用的永久性变形和异状。/ Upon completion of the test, the fittings have neither permanent deformation which render it unsuitable for use nor abnormality which will render it unsuitable for use.

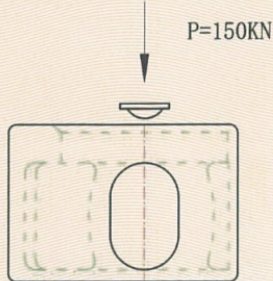
验船师/Surveyor:

(Ji Pengfei)

冲击试验

Impact test

加载示意图/ Loading schematic figure



实际加载/ Actual loading

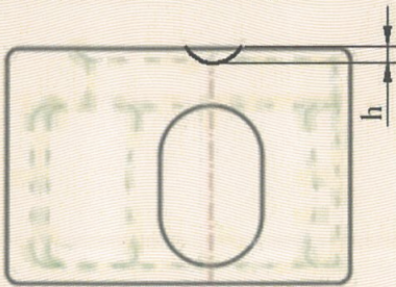


冲击试验/ Impact test

试验条件/ Test condition:

- | | |
|---------------------------------------|----------------------|
| 1) 部件及试样编号/ Components and sample No. | 顶角件/ Top fitting T-4 |
| 2) 试验载荷/Load (P): | 150kN |
| 3) 保持时间/Duration : | 120s |
| 4) 试验依据/Test evidence : | ISO1161:2016 8.3.9 |

测量示意图/ Measurement schematic figure



检查结果/Result:

试样编号/ Sample No.	初始值/ Initial value	变形值 h/ Deformation h
T-4	0	1.2mm

备注/Remark:

- 1、测量顶角件试验后压痕深度。

Measuring the indentation depth after the test for the top fitting.

结论/Comments:

- 1、试验后，角件底面压痕深度大于 ISO1161 标准值中钢质角件要求值 0.3mm。 / Upon completion of the test, the indentation depth on top wall is greater than 0.3mm in ISO1161 standard value of steel fitting.

验船师/Surveyor:

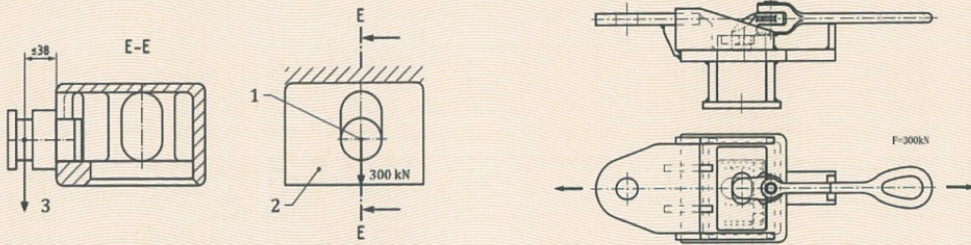
纪鹏飞

(Ji Pengfei)

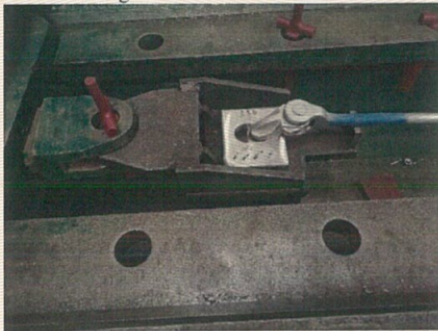
拉杆试验

Lashing bar test

加载示意图/ Loading schematic figure



实际加载/ Actual loading

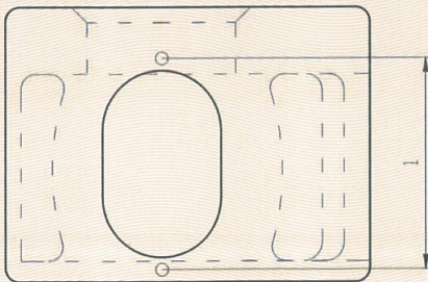


拉杆试验/ Lashing bar test

试验条件/ Test condition:

- | | |
|---------------------------------------|-------------------------|
| 1) 部件及试样编号/ Components and sample No. | 底角件/ Bottom fitting B-8 |
| 2) 试验载荷/Load (P): | 300kN |
| 3) 保持时间/Duration : | 120s |
| 4) 试验依据/Test evidence : | ISO1161:2016 8.3.10 |

测量示意图/ Measurement schematic figure



检查结果/Result:

测量位置/ Measuring position	初始值/ Initial value	加载后值/Value after load	变形值/ Deformation
1	101.2mm	102.1mm	0.9mm

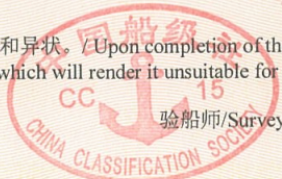
备注/Remark:

- 1、测量位置为底角件端孔长径方向。

The measuring position is deformation of the long diameter direction of the bottom fitting side aperture.

结论/Comments:

- 1、试验后，角件未出现影响使用的永久性变形和异状。 Upon completion of the test, the fittings have neither permanent deformation which render it unsuitable for use nor abnormality which will render it unsuitable for use.



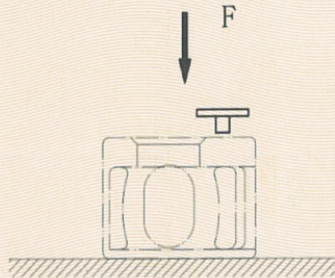
验船师/Surveyor:

纪鹏飞

(Ji Pengfei)

偏置试验 Misgather test

加载示意图/ Loading schematic figure



实际加载/ Actual loading

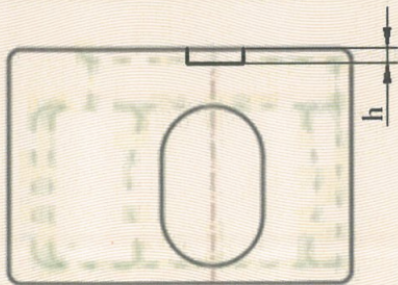


偏置试验/ Misgather test

试验条件/ Test condition:

- | | |
|---------------------------------------|---|
| 1) 部件及试样编号/ Components and sample No. | 顶角件/ Top fitting T-5, T-6, 底角件/ Bottom fitting B-5, B-6 |
| 2) 试验载荷/Load (P):: | 150kN |
| 3) 保持时间/Duration : | 120s |
| 4) 试验依据/Test evidence : | ISO1161:2016 8.3.11 |

测量示意图/ Measurement schematic figure



检查结果/Result:

试样编号/ Sample No.	初始值/ Initial value	变形值 h/ Deformation h
T-5	0	0.3mm
T-6	0	0.4mm
B-4	0	0.4mm
B-5	0	0.5mm

备注/Remark:

- 1、测量顶角件和底角件试验后压痕深度。

Measuring the indentation depth after the test for the top fittings and the bottom fittings.

结论/Comments:

- 1、试验后，角件未出现影响使用的永久性变形和异状。/ Upon completion of the test, the fittings have neither permanent deformation which render it unsuitable for use nor abnormality which will render it unsuitable for use.

验船师/Surveyor:

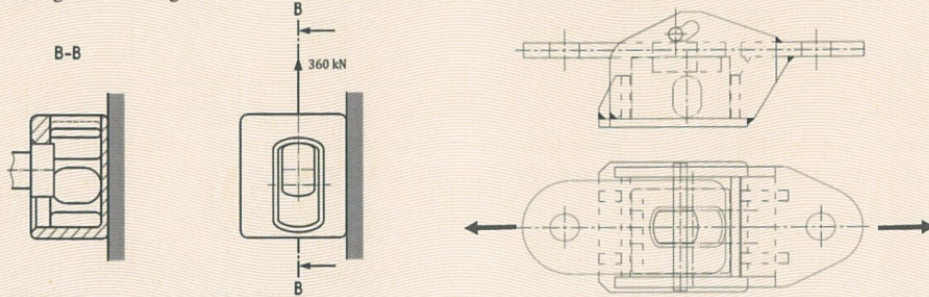
纪鹏飞

(Ji Pengfei)

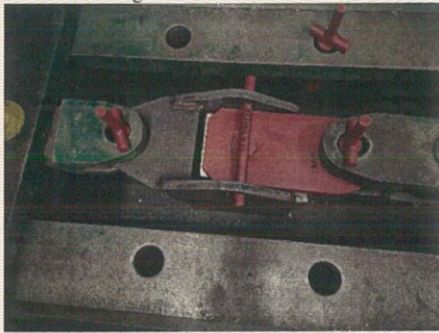
铁路系固试验（剪切）

Rail securing test (shear)

加载示意图/ Loading schematic figure



实际加载/ Actual loading

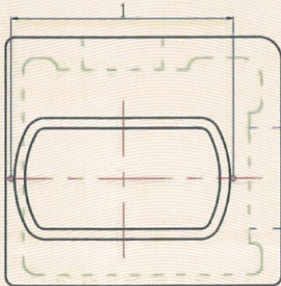


铁路系固试验（剪切）/ Rail securing test (shear)

试验条件/ Test condition:

- | | |
|---------------------------------------|-------------------------|
| 1) 部件及试样编号/ Components and sample No. | 底角件/ Bottom fitting B-6 |
| 2) 试验载荷/Load (P): | 360kN |
| 3) 保持时间/Duration : | 120s |
| 4) 试验依据/Test evidence : | ISO1161:2016 8.3.12 |

测量示意图/ Measurement schematic figure



检查结果/Result:

试样编号/ Sample No.	初始值/ Initial value	加载后值/Value after load	变形值/ Deformation
B-6	149.0mm	149.1mm	0.1mm

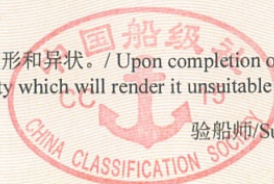
备注/Remark:

- 1、测量位置为底角件底孔长径方向。

The measuring position is deformation of the long diameter direction of the bottom fitting bottom aperture.

结论/Comments:

- 1、试验后，角件未出现影响使用的永久性变形和异状。/ Upon completion of the test, the fittings have neither permanent deformation which render it unsuitable for use nor abnormality which will render it unsuitable for use.



验船师/Surveyor: (Ji Pengfei)