

## APPENDIX 3

### Quality and Operations Assessment Schedule for Cutting and Bending Reinforcing Steel

#### 1 Scope

This Schedule describes minimum quality and operational control requirements for cutting and bending reinforcing steel conforming to the requirements of AS/NZS 4671 Grades 250N, 500N and 500L, and is additional to the quality management operational and general requirements contained in Appendix 1.

It covers the supply of processed reinforcing steel commencing with the supply of raw materials from ACRS certified or approved mills, through to the supply of finished product in standard lengths or cut and bent in accordance with customer requirements.

#### 2 Processing

- 1 There shall be documented procedures for cutting and bending operations that ensure consistency of product, dimensional accuracy and that the finished product conforms to the relevant schedule and any other customer requirements.
- 2 *There shall be documented procedures for sub-contracting cutting and bending operations that ensure that the finished product meets the requirements of the purchase order, that batch identity is maintained, and that the prime contractor is supplied with full details of each consignment by the sub-contractor at the time of despatch to the customer. Work shall only be sub-contracted to ACRS certified processors.*

#### 3 Traceability

- 1 The heat or batch identity shall be maintained on all feedstock awaiting initial processing. It shall be possible to cross-reference all feedstock with the suppliers test certificates and delivery documentation.
- 2 The heat or batch identity of each bundle or coil of feedstock shall be maintained through the first processing step (typically cutting to length for bar stock or processing on automatic straighteners/cutters/benders for coiled product). It is recommended that individual heat or feed batch identity be maintained as far as possible beyond this first processing operation.
- 3 All items or bundles of finished product shall carry a unique code that is in accord with the customer's schedule. There shall be additional information attached to each item or bundle of finished product that enables the heat or feedstock batch identity, or possible heat or batch identities to be determined.
- 4 For each feedstock heat or batch processed, the actual bundle or bundles of finished product that contain or may contain any given heat or feedstock batch shall be able to be identified and isolated.

*(Note: The requirements for items 3 and 4 above may be met by recording the date or date and shift of production of each item or bundle of finished product, and also recording the*

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*heat or batch identities of related feedstock processed on the same day or day/shift. Other methods of achieving the outcomes required in 3 and 4 above are not excluded)*

## **4 Product Testing**

### **4.1 Testing by the Manufacturer**

#### **a Dimensional Properties**

The dimensional accuracy of each batch of reinforcing steel shall conform to the requirements of AS/NZS4671, AS3600, and the relevant cutting and bending schedule.

#### **b Chemical and Mechanical Properties**

##### **1 Finished Product cut and/or bent from straight bar feed**

The chemical and mechanical, properties of each batch of the reinforcing steel shall conform to the requirements of AS/NZS4671 and customer specification. The rate of testing shall be not less than that laid down in AS/NZS4671. Where the feed material is supplied from an ACRS accredited source in the form of straight bars, the supplier's chemical and mechanical test results may be used provided the cast is traceable to finished product batches as per 3. above.

##### **2 Finished product cut and/or bent from coil feed**

The chemical and mechanical, properties ( $R_m$ ,  $R_e$ ,  $R_m/R_e$ , Agt) of each batch of the reinforcing steel shall conform to the requirements of AS/NZS4671 and customer specification. The rate of testing shall be not less than that laid down in AS/NZS4671. Where the feed material is supplied from an ACRS accredited source in the form of coil, the supplier's chemical test results may be used provided the cast is traceable to the coil.

Long-term quality levels shall be determined for each size/grade combination in the manner specified in AS/NZS4671 or the customer's standard as appropriate. The test results for the processor's long-term quality level analysis shall be submitted to ACRS at three monthly intervals. These shall be analysed at ACRS and will form part of subsequent surveillance inspections.

There shall be evidence that the processor is aware of the effect that his processing has on reinforcing steel properties by ongoing documented comparisons of finished product results with the steel supplier's batch and Long Term Quality Level results.

### **4.2 Testing by ACRS**

#### **4.2.1 Dimensional Properties**

Dimensional accuracy on cut and bent reinforcing steel shall be checked against the issued cutting and bending schedule and AS 3600 as follows:

##### **a Cut Lengths**

- i Select three different batches of cut lengths
- ii Select three bars from each batch
- iii Measure the length of each bar and check this against the scheduled length and specified tolerances of AS 3600.

##### **b Bent Steel**

- i Select three different batches of bent steel
- ii Select three bars from each batch
- iii Measure the dimensions of each leg and check against the scheduled dimensions and specified tolerances of AS 3600.

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4.2.2 Chemical and Mechanical Properties  
(for reinforcing steel straightened from coil only)

a Test Program

For each manufacturing process/machine type and each grade of steel, the test programme for the Initial Assessment and subsequent Surveillance Inspections shall be as described in Table 1. Testing shall be in accordance with AS/NZS 4671. At the time of initial testing at least *two coils* from different casts of steel of each type shall be available for the selection of the test pieces.

**Table 1**

Inspection	Diameter	Frequency
Initial Assessment	Two diameters	Two casts per diameter of bar ex coil
Surveillance Inspection	One diameter	Two casts per diameter of bar ex coil

For each diameter selected for test, ten samples shall be selected from each cast. These shall be subject to testing at the frequency described in Table 2. Testing shall be carried out to the satisfaction of ACRS and not less than 30% of the testing shall be witnessed by ACRS Assessors.

**Table 2**

Property	Number of tests per cast of bar/coil diameter
R <sub>m</sub>	3
R <sub>e</sub>	3
R <sub>m</sub> /R <sub>e</sub>	3
A <sub>gt</sub>	3
Rebend	3
Rib Geometry	1
Chemistry where required by 4, b	1

b Duplicate Samples

For each test sample described above, a duplicate sample shall be taken to be tested by an independent NATA approved test house. The tests may be increased in the event of any anomalies or difficulties. *The frequency of independent testing may be reduced, upon agreement with ACRS, where the test house holds a valid NATA approval for the relevant tests.*

c Evaluation of Test Results

A statistical comparison of results from the original and duplicate samples shall be undertaken for each test programme. The statistical comparison shall take into account the product form and process route.

The samples shall be deemed to comply with the requirements for yield strength (R<sub>e</sub>) if for each cast sampled –

- i no result falls below 95% of the specified minimum characteristic value; and
- ii no result exceeds 105% of the specified maximum characteristic value; and
- iii not more than one result falls below the specified minimum characteristic value or above the specified maximum characteristic value; and
- iv the mean of the results for each cast lies between 1.02 times specified minimum characteristic value and 0.98 times specified maximum characteristic value, or all results for each cast lie within the specified range.

The samples shall be deemed to comply with the requirements for Elongation (A<sub>gt</sub>) and Ratio (R<sub>m</sub>/R<sub>e</sub>) if the mean of the results for each cast exceeds the specified characteristic value.

d Bond Performance

- i Performance by Measurement

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Where rib configurations of deformed bars are shown to conform, by measurement of the projected rib area, to the requirements of AS/NZS 4671 then a Bond Test need not be carried out. *The testing frequency shall be as described in Tables 1 and 2 - Rib Geometry.*

ii Performance by Bond Test

Bond tests as described in AS/NZS 4671, may be carried out on those deformed bars whose projected rib areas do not conform to the requirements of that standard. The bond test frequency required to establish the bond performance is six test pieces from each size within the approved size range of the manufacturer

An independent, NATA approved test house shall carry out the bond tests.

Where bond testing is used to confirm bond performance the minimum rib dimensions under test shall be recorded and will form part of the manufacturer's production and inspection procedures. Compliance with these shall form part of subsequent ACRS inspections.

e Sample Selection

All samples for the above test programmes shall be selected by ACRS assessors.

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